Alaska's Mineral Industry 2010

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Alaska's Mineral Industry 2010—Division of Geological & Geophysical Surveys Special Report 65

DIVISION OF GEOLOGICAL I
GEOPHYSICAL SURVEYS
in cooperat on with
Division of Economic Development

Alaska's Mineral Industry 2010

by
D.J. Szumigala, L.A. Harbo, and J.N. Adleman

SPECIAL REPORT 65

DEPARTMENT OF NATURAL RESOURCES
Division of Geological & Geophysical Surveys

in cooperation with

DEPARTMENT OF COMMERCE, COMMUNITY & ECONOMIC DEVELOPMENT
Division of Economic Development

Front cover photo: *Development work and production at the Aqqaluk deposit, the beginning of the next 20 years of mining at Red Dog Mine. Development work by Teck Resources Ltd. included building a drainage ditch to divert potential runoff from Red Dog Creek, removing wetlands material and stockpiling for future use, using surface rock for access road construction, then drilling and blasting to prepare additional rock for road construction. The first blasting at Aqqaluk took place on June 8, 2010. Teck was successfully mining ore from the Aqqaluk deposit by August 2010. Photo provided by Teck Resources Ltd.*

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Alaska Division of Geological & Geophysical Surveys
3354 College Rd., Fairbanks, Alaska 99709-3707
Phone: (907) 451-5020 Fax (907) 451-5050
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EXECUTIVE SUMMARY

Alaska's Mineral Industry 2010 is the 30th annual report produced by the Division of Geological & Geophysical Surveys (an agency of the Department of Natural Resources) and the Division of Economic Development (of the Department of Commerce, Community, & Economic Development).

Alaska's mineral industry continues to grow in strength and size based in part on the great mineral potential of the state and its strategic location. Mineral exploration expenditures were up 47 percent from 2009 levels to $264.4 million in 2010. This marked the sixth consecutive year with exploration expenditures exceeding $100 million. Development expenditures in Alaska in 2010 declined by nearly 11 percent, to approximately $293.3 million, from $330.8 million in 2009. Despite the decline, this was the seventh consecutive year development expenditures exceeded $200 million. Mineral production volumes remained strong. The estimated gross wholesale (first market) value of mineral production in 2010 increased more than 27 percent, to $3,126.8 million, from $2,455.6 million in 2009.

Mineral industry employment rose in 2010 to 3,872 full-time-equivalent jobs, an increase of 592 jobs (18 percent) from the 2009 total of 3,280. The largest change in employment from 2009 was a gain in mineral development jobs from 371 to 537, an almost 45 percent increase. Exploration jobs also increased from 422 jobs in 2009 to 520 in 2010, a 22 percent increase. Mineral production employment increased significantly in 2010, with 2,815 jobs across all production sectors in 2010, compared with 2,487 jobs in 2009. The Alaska industry also created an estimated 2,000 indirect jobs.

Estimated revenues in 2010 to the State of Alaska and municipalities from mineral-industry-specific fees, rent, sales, royalties, and taxes amounted to more than $86.5 million. State corporate income tax payments are unavailable for 2010 and could not be included in the revenue total.

Mineral exploration expenditures in Alaska during 2010 were at least $264.4 million. Exploration was distributed across Alaska, but more than $127 million (or 48 percent of the exploration funds) was spent in southwestern Alaska and $55 million was spent in the Eastern Interior region. Thirty-four projects reported exploration expenditures of $1 million or more and 47 additional projects expended at least $100,000. Most exploration funds, approximately 70 percent, were from Canadian sources.

Exploration was conducted in Alaska during 2010 for a wide variety of metals and mineralization styles. Gold, grouped with other precious metals, remained a major exploration commodity with more than 47 percent of total exploration expenditures, but exploration expenditures for deposits with a mixed group of metals (polymetallic) were also very strong and accounted for almost 47 percent of total exploration expenditures. Copper–gold–molybdenum porphyry systems were the major exploration target in 2010, with slightly less than $100 million in expenditures. Almost $93.9 million was spent on granite/intrusion-related gold exploration, almost $21.5 million was spent on various gold–quartz vein projects and $29.3 million was spent on base-metal-rich, polymetallic massive-sulfide projects. About $9.3 million was spent on PGE–nickel–copper ultramafic-hosted deposits, and almost $11.1 million was spent on rare-earth element, diamond, tin, coal, placer gold, and other deposit types, including significant expenditures exploring for iron–titanium-rich beach placer deposits.

Two advanced exploration projects, Pebble and Donlin Creek, accounted for more than 43 percent of the exploration expenditures in 2010. The Pebble copper–gold–molybdenum porphyry project was the largest exploration project in 2010. Other copper–gold porphyry projects include the Whistler, Chisna, Grizzly Butte, Pyramid, Copper Joe, Cristo, Groundhog, Pebble South, and Big Chunk projects. Exploration for intrusion-related gold deposits continued at the Fort Knox, Donlin Creek, Livengood, Colorado Creek, Estelle, Vinasale, Gil, Liberty Bell, Uncle Sam, Mystery Mountains, Tetlin, and Rolling Thunder projects. Work on high-grade gold–quartz veins was conducted at the Kensington, Pogo, Stone Boy, Lucky Shot, Money Rock, Bluff, Council, LMS, Terra, Nyac, Herbert Glacier, and Golden Summit projects. Base-metal exploration was conducted at the Red Dog and Lik SEDEX properties, at the Greens Creek Mine, Palmer, Niblack, and Ambler VMS properties, LWM carbonate-hosted project, and at the Besshi-type Caribou Dome copper project. Platinum, nickel, and associated metals exploration continued at the Duke Island and MAN projects. Other exploration continued for rare-earth elements (Bokan Mountain), gold–copper skarns (Nixon Fork, Kugruk), metamorphic gold (Kelly Creek), iron–titanium–gold sands (Trinity Island), gold–antimony veins (Nolan Creek, Tushtena), and coal (Wishbone Hill, Stone Horn Ridge).

Prospecting sites and mining claims were staked across all regions of Alaska. New mining claims staked during 2010 included 7,578 new state claims, 88 new state prospecting sites, and 332 new federal claims. Alaska had 8,413 active federal and 45,194 active state mining claims in 2010. The amount of land in Alaska under claim increased approximately 16.5 percent from 2009 to 2010, with approximately 4.49 million acres of land covered by claims and prospecting sites in 2010.

The Alaska Division of Geological & Geophysical Surveys (DGGS) conducted geologic mapping and minerals-related studies in the southern part of the Livengood mining district and contracted helicopter-borne geophysical surveys for the Iditarod and Ladue areas of southwestern and eastern Alaska. DGGS released airborne geophysical surveys of the Moran survey area, Melozitna and Tanana quadrangles, central Alaska, in early 2010.

Reported and estimated development expenditures in 2010 were approximately $293.2 million, an 11 percent decrease from the 2009 value of $330.8 million. Development expenditures were reported for 25 projects in 2010. Significant development expenditures were noted at Red Dog Mine, Fort Knox Mine, Pogo Mine, Rock Creek Mine, Greens Creek Mine, Kensington Mine, and the Chuitna coal project. Based on expenditures, Kensington Mine was the largest mineral development project in Alaska in 2010.

The total value of mineral production in Alaska during 2010 is estimated at $3.13 billion, considerably more than the 2009 level but slightly below the 2007 record production value of $3.37 billion. The 2010 estimate represents an increase in value of approximately $669.8 million, or 27 percent, from the 2009 production value of $2.46 billion. Metals (gold, silver, copper, lead, and zinc) account for $2,999 million (about 96 percent of the total); coal and peat for $73.31 million; industrial minerals for $50.90 million; and gemstones and semiprecious stones for $2.30 million.

Zinc leads all mineral product values, with 42 percent of the total; Red Dog Mine was the most significant contributor to total zinc production. Gold remained a strong second, carrying 35.83 percent of total value. In descending order, the values of remaining production are lead, 9.09 percent; silver, 9.04 percent; coal and peat, 2.35 percent; and industrial minerals (rock, sand, gravel, and gemstones), 1.7 percent.

Alaska currently has six large lode mines. Teck Resources Ltd.–NANA's Red Dog Mine, one of the world's largest zinc producers, received all permits and began mining the Aqqaluk deposit adjacent to the main Red Dog deposit, extending the mine's life to 2031. Red Dog produced 593,043 tons of zinc, 121,144 tons of lead, and more than 6.7 million ounces of silver. Coeur's Kensington underground gold mine complex near Juneau began mining on July 3 and produced 43,143 ounces of gold in 2010. Hecla Mining Co.'s Greens Creek Mine near Juneau produced more than 7.2 million ounces of silver in 2010, along with 68,838 ounces of gold, 74,496 tons of zinc, and 25,336 tons of lead. Kinross Gold's Fort Knox Mine near Fairbanks produced 349,729 ounces of gold, and Sumitomo's Pogo Mine produced 383,434 ounces of gold. Usibelli Coal Mine produced 2.06 million tons of coal. Placer gold production, from more than 225 operators, was 69,318 ounces.

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Alaska's Mineral Industry 2010

D.J. Szumigala[1], L.A. Harbo[2], and J.N. Adleman[3]

INTRODUCTION

Alaska has long been considered a frontier compared with most of North America, and it still maintains that status regarding mineral resources. The state's abundant natural resources drew explorers for the past two centuries and remains a driving force in its economy. Juneau, Nome, Fairbanks, and other towns across the state were built around early mining camps, and mining remains a significant local source of employment, infrastructure, and government revenue. The unmatched geologic diversity of Alaska hosts a wide range of metallogenic settings and mineral commodities.

The great mineral potential of the state is evident by past production from multiple world-class deposits: placer gold from the Fairbanks and Nome mining districts; copper from the Jumbo, Bonanza, Erie, Mother Lode, and Green Butte mines in the Kennecott district; gold from the Alaska–Juneau (A–J) and Treadwell mines near Juneau; and placer platinum from the Goodnews Bay mining district. Alaska's world-class deposits currently in production are Red Dog, Greens Creek, and Fort Knox mines. The Pebble, Donlin Gold, and Money Knob deposits indicate that there are still extremely large mineral deposits to be developed in Alaska. Undoubtedly, other Alaska mineral deposits remain to be discovered.

Alaska is strategically located along the Pacific Rim and offers prospective land, sanctity of title, a state-sponsored geological and geophysical mapping effort, a reasonable permitting process, capable workforce, exploration incentives, and inventive infrastructure equity-sharing programs. More than 190 million acres of federal, state, and Native lands are open for mineral-related activities and mining. It is the policy of the State of Alaska to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest.

The Alaska minerals industry continues to grow in size and strength. Table 1 and figure 1 show the estimated value of exploration and development investments in the industry and the estimated 'first market value' (estimated gross value of mineral products at first wholesale) of mineral production in Alaska between 1981 and 2010. For purposes of this report, Alaska has been divided into seven geographic regions, shown in figure 2.

Exploration expenditures, a sign of industry interest and production values to come, were up 47 percent from 2009 to $264.4 million in 2010. This marked the sixth consecutive year with exploration expenditures exceeding $100 million. Development expenditures in

Table 1. Reported annual exploration and development expenditures of the mineral industry and the estimated first market value of mineral production in Alaska (in millions of dollars), 1981–2010. Average annual values are given for 1981–1985, 1986–1990, 1991–1995, and 1996–2000. Individual year totals are provided for 2001–2010.

Year	Exploration Expenditures	Development Expenditures	Estimated First Market Value
1981–1985	$ 37.5	$ 36.3	$ 204.7
1986–1990	$ 36.2	$ 109.6	$ 288.6
1991–1995	$ 33.2	$ 55.3	$ 520.1
1996–2000	$ 49.4	$ 158.7	$ 917.4
2001	$ 23.8	$ 81.2	$ 917.3
2002	$ 26.5	$ 34.0	$1,012.8
2003	$ 27.6	$ 39.1	$1,000.7
2004	$ 70.8	$ 209.1	$1,338.7
2005	$103.9	$ 347.9	$1,401.6
2006	$178.9	$ 495.7	$2,858.2
2007	$329.1	$ 318.8	$3,367.0
2008	$347.3	$ 396.2	$2,427.1
2009	$180.0	$ 330.8	$2,455.6
2010	$264.4	$ 293.3	$3,126.8

Source: Alaska's Mineral Industry reports published annually by DGGS/Commerce. Please see Exploration, Development and Production sections for further details.

[1]Alaska Division of Geological & Geophysical Surveys, 3354 College Rd., Fairbanks, Alaska 99709-3707; david.szumigala@alaska.gov
[2]Alaska Division of Economic Development, 211 Cushman St., Fairbanks, Alaska 99701; lisa.harbo@alaska.gov
[3]Alaska Division of Economic Development, 550 W. 7th Ave., Suite 1770, Anchorage, Alaska 99501-3576; jennifer.adleman@alaska.gov

Alaska declined in 2010 to approximately $293.3 million from $330.8 million in 2009, an 11 percent decrease. This marked the seventh consecutive year development expenditures were above $200 million. Mineral production volumes remained strong. The estimated first market value of mineral production in 2010 increased more than 27 percent, to $3,126.8 million, from $2,455.6 million in 2009.

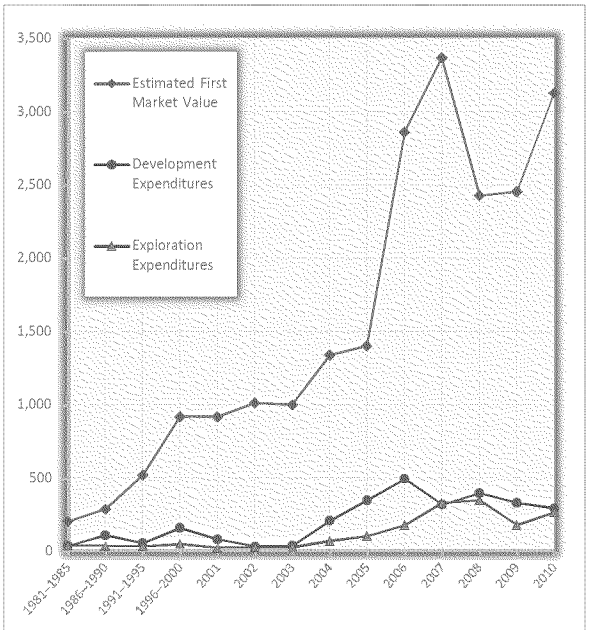


Figure 1. Exploration and development expenditures and estimated first market value for the mineral industry, 1981–2010.

Past-year statements issued by mining companies, including press releases, corporate annual and financial reports, as well as phone interviews, and replies to questionnaires, are factored into the exploration and development values. Average metal prices are calculated for the first market values and are from the daily London PM closing price for gold, and from the average weekly spot price on the London Metal Exchange for the other metals. It is important to note that these prices are used to calculate the estimated first market value of metals produced in the state, but do not take into account the costs of mining or transportation or smelter charges and penalties. Coal prices are estimated from average coal prices for similar grade material around the Pacific Rim. Industrial material prices are based on regional rates provided by some operators.

Please note that the formatting and presentation of data in some tables differ from previous editions of this report, reflecting changes in data collected and accounting practices by the mining industry. Whenever possible, the authors have worked to maintain consistency of data for seamless year-to-year comparisons. Most changes are described in footnotes in the affected tables. Subsequent annual reports will be available predominantly online as a PDF document, with a very limited edition in print. Future annual reports will also include substantial changes in the presentation of the economic data in the report.

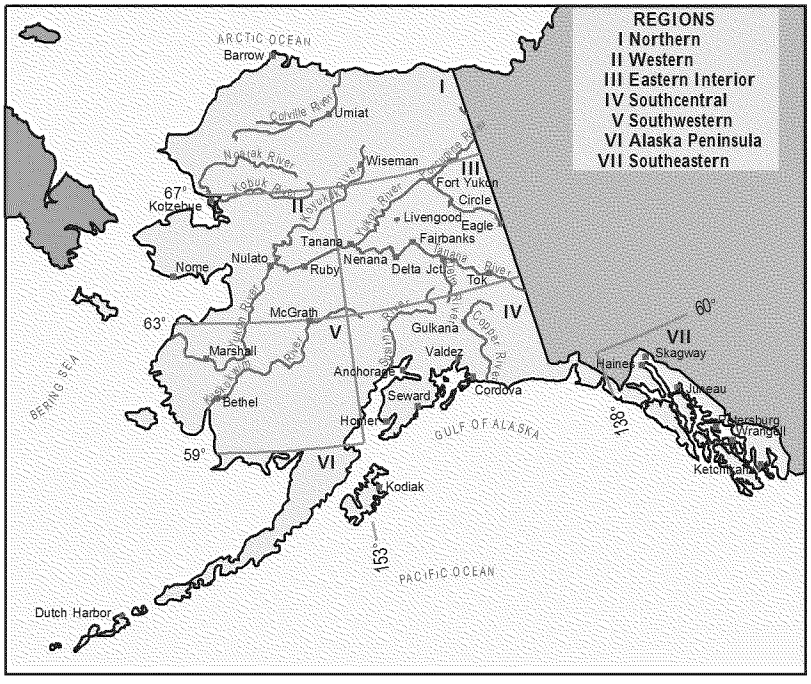


Figure 2. Regions of mineral activity as described in this report.

This summary of Alaska's mineral industry activity for 2010 is the 30th in the series of annual reports, and is made possible by information provided through press releases, company annual and financial reports, phone interviews, other research, and replies to questionnaires mailed by the Alaska Division of Geological & Geophysical Surveys (DGGS). This report is part of a cooperative project between DGGS and the Division of Economic Development in the Department of Commerce, Community and Economic Development (Commerce).

ACKNOWLEDGMENTS

The intent of this report on Alaska's mineral industry is to provide current, accurate, and technically reliable information.

The authors thank the companies, agencies, and individuals that responded to the questionnaires or phone calls and provided information about their activities and operations. Without their voluntary and timely information this report would not be possible. DGGS mailed more than 870 questionnaires in December 2010 and continued sending additional questionnaires through 2011. DGGS received more than 160 responses and followed questionnaire requests with phone calls and other means of contact. David Szumigala (DGGS), Lisa Harbo (Commerce), and Jennifer Adleman (Commerce) prepared the body of the text, tables and appendices with information supplied by many individuals. Some photos and images used in this report were provided by members of the public. These contributions are greatly appreciated. Where appropriate, these contributors have been acknowledged in the text.

The booklet's design, layout, and cover are by Joni Robinson (DGGS); graphic illustrations were created and updated by David Szumigala; and Paula Davis (DGGS) updated the graphs and charts and edited the final version. Commerce's Division of Economic Development provided funds for printing.

EMPLOYMENT

Employment data was collected from two different sources and is presented as such. Initial reporting below stems from values compiled from more than 160 questionnaires and other documents returned to DGGS by mining and minerals companies, agencies, and individuals. The data obtained from this questionnaire is used throughout this report. Additional wage and salary employment data described further below is from the Alaska Department of Labor and Workforce Development (DLWD)[4]. There is no direct correlation between the two sets of employment figures. For example, the DLWD 2010 mining employment and wage statistics are based on 71 reporting units (companies) consisting of one coal, 39 metal ore, and 31 nonmetallic-mineral quarrying units. The DLWD data referred to here also includes part-time jobs and does not include the self employed, such as the majority of placer operators. Their employment data may not include jobs in the exploration and development phases of mining. Jobs in these mining phases are often grouped by the DLWD in the engineering, environmental, or construction industries. Consequently, mining's contributions to employment and earnings in Alaska is likely underestimated.

Figures 3 and 4 display employment within various sectors of Alaska's mineral industry as reported to DGGS via questionnaires completed and returned by the minerals and mining industry in Alaska. Table 2 lists estimated employment in the Alaska minerals industry for the past nine years, and figure 5 presents the trends in that employment over the same period.

Total reported minerals industry employment in 2010 is 3,872 full-time-equivalent jobs, an increase of 592 jobs (18 percent) from the estimated 2009 total of 3,280. The largest change in employment compared with 2009 was a gain in mineral development jobs from 371 to 537, an almost 45 percent increase. Exploration jobs also increased from 422 jobs in 2009 to 520 in 2010, a 23 percent increase.

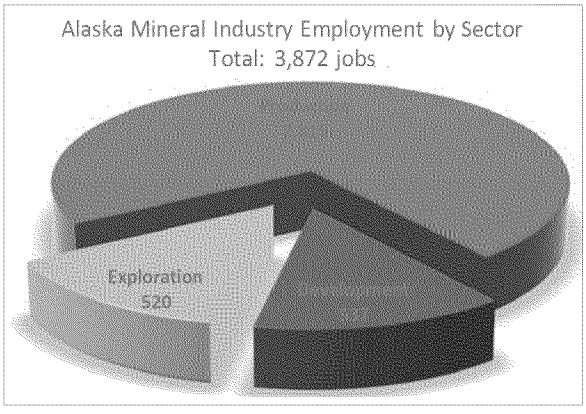


Figure 3. 2010 mineral industry employment in Alaska by category.

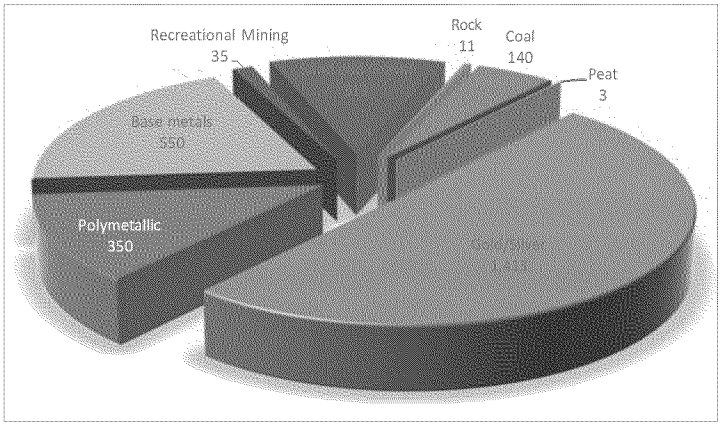


Figure 4. 2010 Alaska mineral industry employment in production sector, by commodity.

[4]State of Alaska Department of Labor and Workforce Development, Research and Analysis Section, Quarterly Census on Employment and Wages (QCEW), last accessed on September 12, 2011. http://labor.alaska.gov/research/qcew/qcew.htm

Mineral production employment increased significantly in 2010, with 2,815 jobs across all production sectors in 2010, compared with 2,487 jobs in 2009. Lode gold mining jobs increased approximately 21 percent in 2010, adding 176 jobs to the economy. Placer gold mining employment increased in 2010, with a reported gain of six full-time-equivalent jobs from the 399 jobs estimated for 2009. Full-time-equivalent jobs increased in the base-metals sector by 137 jobs, or approximately 33 percent, from 2009 to 2010. Modest employment increases were seen in the polymetallic, coal, and sand and gravel mining sectors.

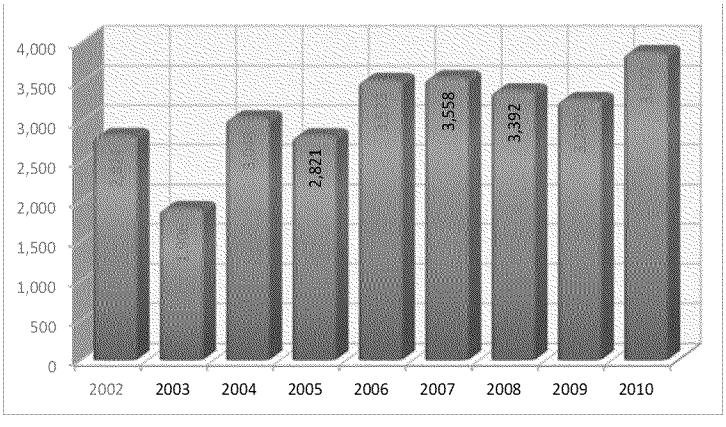
According to DLWD, the average monthly wage paid for mining in Alaska during 2010 was $8,084, compared with an average monthly wage for all industries in Alaska of $3,977 in 2010. The average monthly wage for metal mining in Alaska during 2010 was $8,345, according to DLWD. Mining jobs in Alaska have higher earnings than any other industry except oil and gas. The average annual wage in 2010 for mining employees was $97,000,

Table 2. Estimated Alaska mine employment, 2002–2010[a], as reported via questionnaire conducted by DGGS for this report.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Gold/silver mining									
Placer	148	82	64	86	242	208	282	399	405
Lode	413	325	433	411	704	808	739	832	1,008
Polymetallic mining	262	295	265	250	245	276	317	321	350
Base metals mining	580	388	508	449	457	457	475	413	550
Recreational mining	180	175	175	175	45	54	30	36	35
Sand and gravel	702	349	567	400	337	284	277	286	313
Rock	177	35	475	148	104	124	93	83	11
Coal[b]	100	65	90	95	95	102	110	117	140
Peat[b,c]	21	20	4	6	11	11	7	--	3
Tin, jade, soapstone, ceramics, platinum	20	20	--	--	--	--	--	--	--
Production (total of above categories)	**2,603**	**1,754**	**2,581**	**2,020**	**2,240**	**2,324**	**2,330**	**2,487**	**2,815**
Mineral development	**135**	**64**	**283**	**498**	**848**	**735**	**516**	**371**	**537**
Mineral exploration	**86**	**88**	**184**	**303**	**435**	**499**	**546**	**422**	**520**
TOTAL	**2,824**	**1,906**	**3,048**	**2,821**	**3,523**	**3,558**	**3,392**	**3,280**	**3,872**

[a]Reported man-days are calculated on a 260-day work year to obtain average annual employment unless actual average annual employment numbers are provided.
[b]Coal and peat employment numbers are combined in 2009.
[c]This figure does not include all of the man-days associated with peat operations; most of those man-days are included in sand and gravel numbers.
-- = Not reported.

Figure 5. Total mineral industry employment in Alaska from 2002 through 2010.



and the average annual wage for employees in mineral mining support activities was $86,500. Mining jobs earn more than twice the Alaska average annual earnings of $47,724. DLWD reports that mining wages in Alaska totaled $218,032,010 in 2010.

The agency reported that the total mining and support activities employment was 2,403 full-time-equivalent positions in 2010, up from 2,127 in 2009, with total employment in all industries in Alaska during 2010 at 323,410 jobs. The average 2010 non-oil-and-gas-related mining employment was 2,248, up from 2,014 in 2009. Of these 2,248 jobs, metal mining employment increased from 1,767 in 2009 to 1,968 in 2010, while coal and other mineral mining employment rose from 247 to 280. Support activities employment increased to 155 in 2010, up from 112 in 2009.

DLWD data shows that nonmetallic mineral product manufacturing provided 308 jobs, including an average of 295 jobs in cement and concrete manufacturing for 2010. Primary metal manufacturing provided 21 full-time-equivalent jobs, while metal and mineral merchant wholesalers provided an average of 110 jobs during 2010.

The *Alaska Economic Trends January 2011*, by the Research and Analysis section of DLWD, reported that over the last decade, mining has been one of Alaska's paramount employment performers, growing by more than 40 percent compared with 14 percent for the overall wage and salary workforce[5].

Sixteen boroughs or census areas reported non-oil-and-gas mining employment in 2010. The Fairbanks North Star Borough, the City and Borough of Juneau, and the Northwest Arctic Borough report average employment of between 400 and 500 mining and support activity jobs. According to DLWD, Greens Creek, Red Dog, and Pogo mines were the largest private employers in 2010 in Juneau, the Northwest Arctic Borough, and Southeast Fairbanks Census Area, respectively. Fort Knox Mine and Usibelli Coal Mine are both the third-largest private employers in their respective boroughs.

The Alaska mining industry also created an estimated 2,000 indirect jobs, according to a 2011 study prepared for the Alaska Miners Association Inc. by McDowell Group Inc[6]. Mining companies strengthen Alaska's local economies by employing Alaska residents from more than 120 Alaska communities and by purchasing supplies and services from hundreds of Alaska businesses.

GOVERNMENT REVENUES FROM ALASKA'S MINERAL INDUSTRY

The minerals industry pays revenues to the State of Alaska through a number of instruments. Those instruments include State claim rentals, production royalties, annual labor, coal land rentals, coal royalties, material (rock, sand, and gravel) sales from State of Alaska and Alaska Mental Health Trust Land Office and State Pipeline Coordinator's Office (SPCO) managed lands, miscellaneous fees, State fuel taxes, corporate income taxes, and mining license taxes. Municipalities also receive revenues from the minerals industry for property taxes, payments in lieu of taxes (PILT), severance taxes, and sales taxes. The estimated minimum total revenues paid to the State and municipalities for 2010 amounted to more than $86.5 million. This number will be augmented; the revenue collected as State corporate income tax was not available at the time of printing. The 2010 figure is an increase from the updated amount of $72.8 million paid in 2009. Table 3 provides an itemized listing of estimated minimum revenues paid to the State and municipalities. These revenues are incomplete and serve only as a minimum. Estimated revenues to the State of Alaska and municipalities from mineral-industry-specific fees, rent, sales, royalties, and taxes are shown in figure 6. Figure 7 charts the trend in revenue collected by the State of Alaska and municipalities from the mineral industry from 2005 through 2010.

Estimated state mineral and coal rents and royalties amounted to $11,037,967 for 2010, compared with $6,441,734 for 2009, an increase of more than 71 percent. Table 3 provides a detailed breakdown of these payments. The State of Alaska mining laws grant the holder of a mining claim exclusive right to the locatable minerals in the ground covered by that mining claim. State mining claims have recording, rental, and other fees associated with them. Mining claim location certificates and recording fees must be recorded in the recording district office in which the claim is located within 45 days of the posting date. Recording fees change from time to time, and the nearest recorder's office should be contacted for the most up-to-date fees. For contact information, please see the resources listed at the end of this section. Rental fees under regulation 11 AAC 86.215 are shown in table 4, and must be paid according to the instructions on the back of the certificate form.

[5]Alaska Department of Labor and Workforce Development, 2011, Alaska Economic Trends, January 2011: Alaska Department of Labor and Workforce Development, vol 31, no. 1, p. 5, http://labor.alaska.gov/trends/jan11.pdf .

[6]The McDowell Group, 2011, The Economic Benefits of Alaska's Mining Industry:The McDowell Group, http://www.alaskaminers.org/mcd10sum.pdf.

Table 3. Reported and estimated revenues paid to the State of Alaska and municipalities by Alaska's mineral industry, 2005–2010. Please see footnotes for reporting sources and dates.

	2005	2006	2007	2008	2009	2010
State mineral rents and royalties[a,b]						
State claim rentals	$ 3,308,752	$ 3,460,803	$ 4,649,795	$ 3,082,071	$ 3,295,631	$ 7,201,705
Production royalties[c]	124,338	171,220	800,548	1,518,622	1,368,526	1,299,554
Annual labor	332,439	155,007	163,279	380,169	482,858	157,848
Subtotal	**$ 3,765,529**	**$ 3,787,030**	**$ 5,613,622**	**$ 4,980,862**	**$ 5,147,015**	**$ 8,659,107**
State coal rents and royalties[b]						
Rents	257,112	337,764	253,376	248,841	374,433	143,722
Royalties[c]	1,476,250	1,473,948	1,443,050	1,399,748	920,286	2,235,138
Bonus	129,880	10	- -	- -	- -	- -
Subtotal	**$ 1,863,242**	**$ 1,811,722**	**$ 1,696,426**	**$ 1,648,589**	**$ 1,294,719**	**$ 2,378,860**
State material Sales						
Mental Health[d]	129,409	89,634	24,835	37,734	170,996	109,027
Division of Land[b]	944,905	1,582,769	2,615,810	2,818,107	4,323,601	200,659
State Pipeline Coordinator's Office[i]	46,877	118,904	57,056	182,237	179,875	5,910
Subtotal	**$ 1,121,191**	**$ 1,791,307**	**$ 2,697,701**	**$ 3,038,078**	**$ 4,674,472**	**$ 315,596**
State mining miscellaneous fees[b]						
Filing fees	8,465	965	1,750	2,750	1,787	407,006
Penalty fees	20,280	46,249	24,005	18,876	115,819	43,405
Exploration incentive app filing fee	- -	- -	- -	- -	- -	- -
Bond pool payment	32,331	36,721	43,909	39,429	70,548	91,677
Surface coal mining app fee	3,150	10,897	10,458	3,023	1,800	23,502
APMA mining fees	17,131	17,475	20,877	23,811	19,519	19,873
Subtotal	**$ 81,357**	**$ 112,307**	**$ 100,999**	**$ 87,889**	**$ 209,473**	**$ 585,463**
Other Fees						
AIDEA - Facilities use fees[f]	15,607,000	15,476,000	16,218,000	16,190,000	15,918,000	14,807,000
State Fuel Taxes[g]			726,563	428,214	877,952	2,182,158
State corporate income tax[h]	23,641,883	71,299,684	61,331,540	12,981,369	2,558,970	NA
Mining License Tax[j,k]	18,637,996	79,141,526	54,408,227	16,044,139	29,725,100	43,338,119
State Total[l]	**$ 64,718,198**	**$173,419,576**	**$142,793,078**	**$ 55,399,140**	**$ 60,405,701**	**$ 72,266,303**
Payments to Municipalities[m]	**$ 11,975,892**	**$ 14,388,329**	**$ 15,827,501**	**$ 12,599,399**	**$ 12,387,540**	**$ 14,238,251**
TOTAL[n]	**$ 76,694,090**	**$187,807,905**	**$158,620,579**	**$ 67,998,539**	**$ 72,793,241**	**$ 86,504,554**

[a] Includes upland lease and offshore lease rentals. Figures for 2010 are reported by calendar year by the Alaska Department of Natural Resources.
[b] 2010 figures are reported by calendar year by the Alaska Department of Natural Resources.
[c] Reported on a cash basis; payments actually received during the given year.
[d] Value reported for 2010 is state's fiscal year 2010 (July 1, 2009–June 30, 2010).
[e] SPCO figures for 2005–2008 are fiscal year values; 2009 and 2010 values are calendar year.
[f] AIDEA figures are reported by fiscal year.
[g] State fuel taxes reported for 2010 are aggregated from a small number of companies responding to a request for this information and are reported by calendar year.
[h] 2008 data updated. 2009 data reported here are from the Alaska Department of Revenue, Tax Division, Non-Petroleum Corporate Income Tax Collections by sector. Preliminary data not available for FY2010.
- Only subchapter C corporations pay income tax.
- This report may not reflect 100% of the returns received in a year.
- Data from 2005–2008 has been updated to reflect revenue to the state for the succeeding fiscal year; for example, FY07 receipts are shown in calendar year 2006.

[i] Includes metals, coal, and material.
[j] Mining license tax has been adjusted to reflect actual receipts for the succeeding fiscal year for the period 2005 to 2008; see note for income tax above.
[k] 2009 numbers are preliminary and are subject to revision.
[l] State Total updated for 2009 and incomplete for 2010
[m] Payments to Municipalities reported for 2010 include property taxes for mining companies reported by:
- The Municipality of Anchorage Property Appraisal Division Public Inquiry Search last accessed 9/9/11 at http://redirect.muni.org/propappraisal/_public.html
- Personal communication on 9/9/2011 with the Denali Borough Treasurer
- Personal communication on 9/9/2011 with the City and Borough of Juneau Assessor's Office
- The Fairbanks North Star Borough Assessing Property Search, last accessed 9/9/11 at http://www.co.fairbanks.ak.us/Assessing/propsearch.aspx
- Kenai Peninsula Borough Property Tax Division Search last accessed 9/9/11 at http://ak-kenai.manatron.com/Tabs/ViewPayYourTaxes.aspx
- Personal communication with the Northwest Arctic Borough Treasurer staff

[n] 2009 total is incomplete and underdetermined. It was revised for 2009. The 2010 figure may be revised in the future.

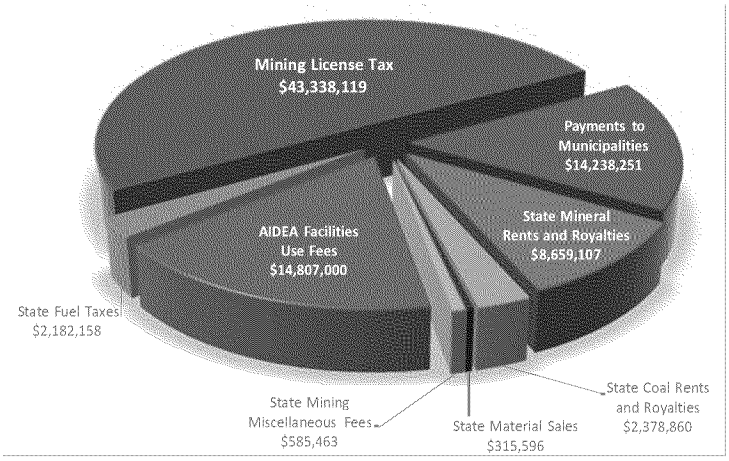


Figure 6. Distribution of 2010 reported mineral industry revenue to State of Alaska and municipalities.

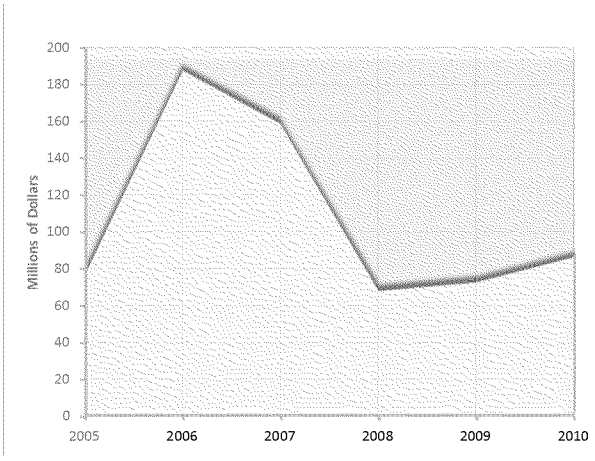


Figure 7. Reported mineral industry revenue to State of Alaska and municipalities, 2005–2010.

Table 4. Alaska state annual claim rental rates by size and maturity. Rental rates were adjusted in 2009 in accordance with the Consumer Price Index for Anchorage as prescribed by statute AS 38.05.211.

Years Since Location	Rental Per Quarter Section Size Claim	Rental Per Traditional Quarter–Quarter Section Size Claim	Rental for All Leases (per acre fee)
0–5	$140	$ 35	$0.88
6–10	$280	$ 70	$1.75
11 or more	$ 680	$170	$ 4.25

Alaska Statute directs DNR to revise the annual rental rates to match the changes in the Consumer Price Index (CPI) for Anchorage as compiled by the U.S. Department of Labor. The statute requires DNR to make the revisions every ten years, so the more than 60 percent increase in 2009 represents the ten-year increase to the CPI. The new rates began for mining claim payments due November 30, 2009, which cover mining claims for the "mining fiscal year" that runs September 1, 2009, through August 31, 2010. The first rental payment covers the period from the date of posting the claim to the following September 1. Annual labor must be performed on a mining claim each year. The annual lease rate for coal properties is $3 per acre. The rental payments may be credited against royalties to the extent that they do not exceed the royalties.

In 1989, the Alaska State Legislature enacted a new production royalty law, Alaska Statute 38.05.212, which requires holders of state mining properties to pay a production royalty on all revenues received from minerals produced on state land. The production royalty requirement applies to all revenues received from minerals produced from a state mining claim or mining lease during each calendar year. Payment of royalty is

in exchange for and to preserve the right to extract and possess the minerals produced. The production royalty is 3 percent of the net income as determined under the Mining License Tax Law AS 43.65 and regulation 15 AAC 65. Department of Natural Resources regulations 11 AAC 86.760–796 provide details regarding the production royalty requirements.

The state sells rock, sand, and gravel from its lands, at a prescribed rate, for use in construction. Land management agencies involved in those sales include Mental Health Trust Land Office (MHTLO), Division of Mining, Land & Water (DMLW), and the State Pipeline Coordinator's Office (SPCO). Sale of these materials generated $315,596 in 2010, compared with $4,674,472 during 2009. This substantial difference is due in part to an 80 percent decrease in material land sales transactions by the SPCO in 2010 compared with 2009. Other common mineral commodities that could be involved in this category include riprap, limestone, slate, peat, and any other substances from the ground that are not designated through the location system for mining claims (for example, gold, silver, or other metals) or leasing (for example, energy minerals such as coal, oil, or gas). Materials are measured and sold by the cubic yard. The price charged for materials depends on the type or size of the sale, but prices are based on a competitive or fair market price of material in the area.

Claim- and leaseholders on State-owned land are also assessed miscellaneous fees. These amounted to $585,463 in 2010, compared with $209,473 in 2009, an increase of approximately 64 percent. Miscellaneous fees comprise filing fees, penalties, exploration incentive application fees, bond pool payments, surface coal mining application fees, and Annual Placer Mining Application (APMA) fees.

Fuel tax collected by the State and reported by a handful of companies for 2010 amounted to $2,182,158, compared with $877,952 during 2009. These numbers were collected from mining companies and are not entirely complete but serve as a minimum estimate. The motor fuel tax is $0.08/gallon and is collected for all fuel for mining operations. Fuel used for heating and stationary power plants is not taxable, and mining operations may submit an application for refund of the full amount. Off-highway fuel use for equipment and vehicles, mobile power plants, pumps, and unlicensed vehicle operation is partially refundable through the application process.

The Mining License Tax was established by statute (AS 43.65) to collect taxes on net income from mining operations after a 3.5-year initial production grace period granted to taxpayers to help return their initial investment. The rates on mining net income are as follows: No tax if net income is $40,000 or less; $1,200 plus 3 percent if over $40,000; $1,500 plus 5 percent if over $50,000; and $4,000 plus 7 percent if over $100,000. The total Mining License Tax collected for 2010 was $43,338,119, compared with $29,725,100 in 2009. Mining License Tax returns are confidential and cannot be reported by individual/entity.

The State of Alaska assessed corporate income taxes on all corporations having net income from mining operations in the state. The total for corporate income tax collected by the state during 2009 from mining operations was $2,558,970. The corporate income taxes collected from mining in 2010 was not available at the time of this printing. Corporate income taxes are confidential and can't be reported by individual corporations. The corporate income tax rate is set by statute and is summarized in table 5.

Table 5. State corporate income tax rate.

Net Income	Base Tax	Plus %	Of Amount Over
<$10,000	$ - -	1%	$ - -
10,000–20,000	100	2%	10,000
20,000–30,000	300	3%	20,000
30,000–40,000	600	4%	30,000
40,000–50,000	1,000	5%	40,000
50,000–60,000	1,500	6%	50,000
60,000–70,000	2,100	7%	60,000
70,000–80,000	2,800	8%	70,000
80,000–90,000	3,600	9%	80,000
>$90,000	$ 4,500	9.40%	$ 90,000

Mining companies paid the City and Borough of Juneau and the Fairbanks North Star Borough almost $6.3 million combined in property taxes in 2010. Red Dog Mine paid almost $7.7 million in PILT to the Northwest Arctic Borough in 2010. Mining companies contributed $107,367 severance tax to the Denali Borough through the extraction of coal, limestone, and gravel for sale, profit, and for commercial use. In 2010, the Alaska Industrial Development and Export Authority (AIDEA) was paid annual user fees of more than $14.8 million for use of the State-owned road and port, the De Long Mountain Regional Transportation System, by Teck Alaska Inc., operator of the Red Dog Mine, and for use of the Skagway Ore Terminal by Minto Explorations Ltd., a subsidiary of Capstone Mining Corp. (formerly Sherwood Copper Corp.).

RESOURCES

Department of Natural Resources

- Recording Fees ht pt//dnr.alaska.gov/ssd/reco f /fees.cfm
- Public Information Center ht pt//dnr.alaska.gov/commis/pic/
- Mining, Land and Water:
  - Annual Placer Mining Application (APMA) 2011 - Forms ht pt//dnr.alaska.gov/mlw/forms/11apma/
  - Fact Sheets ht pt//dnr.alaska.gov/mlw/factsht/
    - Annual Rental ht pt//dnr.alaska.gov/mlw/factsht/mine_fs/annualre.pdf
    - Exploration Incentive Credit Program ht pt//dnr.alaska.gov/mlw/factsht/mine_fs/explore.pdf
    - Land Lease & Contract Payment Information ht pt//dnr.alaska.gov/mlw/factsht/lease_contract_payment_info.pdf
    - Leasing State Land ht pt//dnr.alaska.gov/mlw/factsht/lease_land.pdf
    - Production Royalty ht pt//dnr.alaska.gov/mlw/factsht/mine_fs/produc_t .pdf

Department of Revenue

- Mining License Tax ht pt//www.tax.alaska.gov/programs/programs/index.aspx?60610
- Motor Fuel Tax Claim for Refund ht pt//www.tax.alaska.gov//programs/programs/forms/index.aspx?60210
- Motor Fuel Tax Regulations ht pt//www.tax.alaska.gov//programs/documentviewer/viewer.aspx?203 s
- Alaska Motor Fuel Tax Instructions ht pt//www.tax.alaska.gov/programs/documentviewer/viewer.aspx?1889f

EXPLORATION

Mineral exploration expenditures in Alaska during 2010 were at least $264.4 million, a sharp increase from the $180 million in exploration expenditures reported in 2009, but not approaching the record value of $347.3 million set in 2008. Exploration projects spanned the state. Figure 8 shows the location of the most significant exploration projects in Alaska during the year. Thirty-four projects reported exploration expenditures of $1 million or more and 47 additional projects expended $100,000 or more. Most exploration funds, approximately 70 percent, were from Canadian sources. Almost 20 percent of funds were from overseas sources.

Increased exploration expenditures in Alaska during 2010 generally followed worldwide trends. The increase in many mineral commodity prices in 2010 expanded the amount of venture capital available for mineral exploration. Available helicopters, drill rigs and other equipment and supplies essential to mineral exploration were reportedly in short supply during late 2010.

Figure 9 is a graph of total mineral exploration expenditures in Alaska from 1956 through 2010. Annual exploration expenditures are shown with raw values (not adjusted for inflation) and adjusted values (inflation-adjusted to 2010 dollars). Exploration expenditures over the last several years have exceeded any previous era of mineral exploration in Alaska during the past 50 years. Companies explored for a wide variety of mineral deposits in Alaska during 2010. Table 6 details exploration expenditures by commodity for the past three decades, while figure 10 presents the 2010 data graphically.

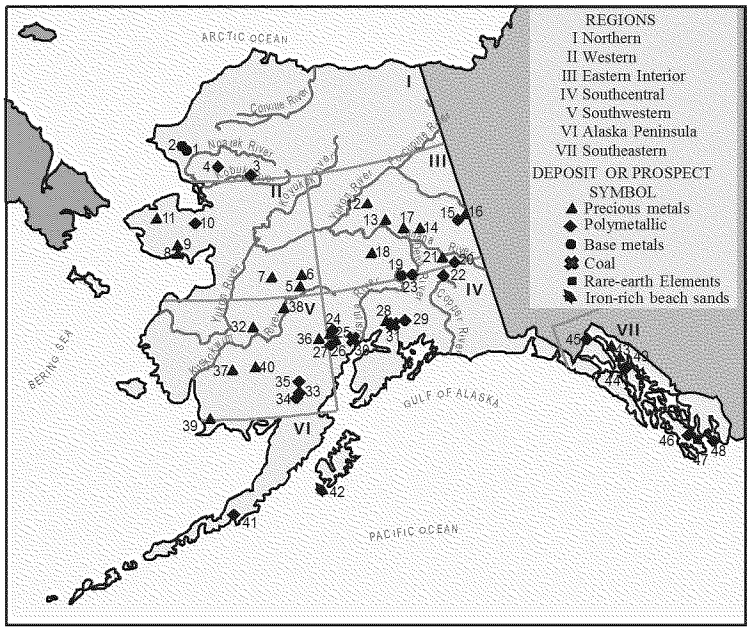
Exploration was conducted in Alaska for a wide variety of metals and mineralization styles during 2010. Gold, grouped with other precious metals, remained a major exploration commodity with more than 47 percent of total exploration expenditures, but exploration expenditures for deposits with a mixed group of metals (polymetallic) were also very strong and accounted for more than 46 percent of total exploration expenditures. Platinum-group-element (PGE) exploration expenditures in 2010 were more than double the average PGE expenditures from 2001 through 2009. Figure 11 shows 2010 Alaska exploration expenditures by deposit type. Copper–gold porphyry systems (grouped with polymetallic deposits in table 6) were the major exploration target in 2010, with slightly more than $99.3 million in expenditures. Almost $93.8 million was spent on granite/intrusion-related gold deposits and almost $21.5 million was spent on various gold–quartz vein deposits. Exploration expenditures of $29.3 million for base-metal-rich, polymetallic massive-sulfide deposits was almost double the $15 million spent in 2009, but still less than the more than $30 million spent in 2008 and almost $59.4 million

I Northern Region

1. Red Dog Mine and area—Teck Alaska Inc.
2. Lik—Zazu Metals Corp.
3. Ambler—NovaGold Resources Inc.
4. Baird Mountain—TintinaGold Resources Inc.

II Western Region

5. Nixon Fork Mine—Fire River Gold Corp.
6. Mystery Mountains—Newmont Exploration Ltd.
7. Colorado Creek— TintinaGold Resources Inc.
8. Bluff—Millrock Resources Inc./ Ryan Gold Corp.
9. Council—Millrock Resources Inc./Ryan Gold Corp.
10. Kugruk—TintinaGold Resources Inc.
11. Kelly Creek—Cedar Mountain Exploration Inc.



III Eastern Interior Region

12. Livengood—International Tower Hill Mines Ltd.
13. Fairbanks District
    a. Fort Knox and district—Kinross Gold Inc.
    b. Golden Summit—Freegold Ventures Ltd.
    c. Gil—Kinross Gold Inc./Teryl Resources Corp.
14. Pogo—Goodpaster mining district
    a. Pogo—Sumitomo Metal Mining Pogo LLC
    b. LMS—First Star Resources Inc./International Tower Hill Mines Ltd.
    c. Money Rock—Precious Metals Exploration Corp./Alix Resources Corp.
    d. Stone Boy—Sumitomo Metal Mining/Stone Boy Inc.
15. LWM and Fortymile—Full Metal Minerals Ltd.
16. Rolling Thunder—Full Metal Minerals Ltd.
17. Uncle Sam—Millrock Resources Inc./Crescent Resources Corp.
18. Liberty Bell—New Gold Inc.
19. Caribou Dome—Caribou Copper Resources Ltd.
20. Tetlin—Contango ORE Co.
21. Tushtena—Triton Gold Ltd./Panoramic Resources Ltd./Tushtena Resources Inc.

IV Southcentral Region

22. Chisna—Corvus Gold Inc./Ocean Park Ventures Corp.
23. MAN—Pure Nickel Inc.
24. Whistler—Kiska Metals Corp.
25. Estelle—Millrock Resources Inc.
26. Cristo—Millrock Resources Inc.
27. Copper Joe—Millrock Resources Inc.
28. Lucky Shot—Harmony Gold Corp./Full Metal Minerals Ltd.
29. Grizzly Butte—Full Metal Minerals Ltd.
30. Stone Horn Ridge—Cook Inlet Region Inc./Laurus Energy Inc.
31. Wishbone Hill—Usibelli Coal Mine Inc.

V Southwestern Region

32. Donlin Creek—Donlin Creek LLC (Barrick Gold Corp./NovaGold Resources Inc.)
33. Pebble—The Pebble Limited Partnership (Northern Dynasty Minerals Ltd./Anglo American PLC)
34. a. Pebble South—The Pebble Limited Partnership/ Full Metal Minerals Ltd.
    b. Big Chunk—Northern Dynasty Minerals Ltd.
35. Groundhog—Kennecott Exploration Co.
36. Terra—Terra Gold Corp./Corvus Gold Corp.
37. Nyac—Nyac Gold LLC and Calista Corp.
38. Vinasale—Freegold Ventures Ltd.
39. Platinum—XS Platinum Ltd.
40. Fortyseven Creek—Newmont Exploration Ltd.

VI Alaska Peninsula Region

41. Pyramid—Antofagasta Minerals PLC/Full Metal Minerals Ltd.
42. Trinity Island—Trinity Metals Corp. Ltd.

VII Southeastern Region

43. Kensington, Jualin—Coeur Alaska Inc.
44. Greens Creek Mine—Hecla Mining Co.
45. Palmer—Constantine Metal Resources Ltd.
46. Niblack—Heatherdale Resources Ltd./Niblack Mineral Development Inc.
47. Bokan Mountain—Ucore Rare Metals Inc.
48. Duke Island—Copper Ridge Explorations Inc./ Quaterra Resources Inc.
49. Herbert Glacier—Grand Portage Resources Ltd./ Quaterra Resources Inc.

Figure 8. Selected exploration projects in Alaska, 2010.

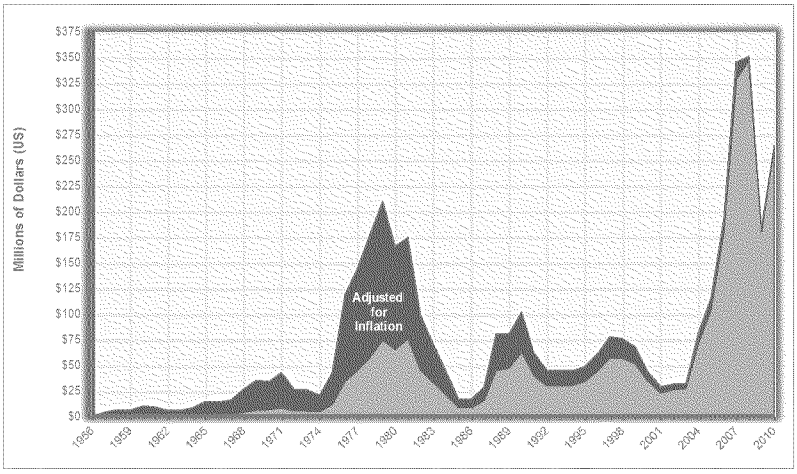


Figure 9. Alaska mineral exploration expenditures, 1956–2010. Inflation adjusted to 2010 dollars.

Table 6. Reported mineral exploration expenditures in Alaska by commodity, 1981–2010.

	Base metals	Polymetallic[a]	Precious metals[b]	Industrial minerals	Coal and peat	Other[c]	Total
1981	$ 28,262,200	N/A	$ 35,273,200	$ 10,300,000	$ 2,341,000	$ 127,000	$ 76,303,400
1982	31,757,900	N/A	10,944,100	- -	2,900,000	15,300	45,617,300
1983	9,758,760	N/A	20,897,555	2,068,300	1,338,454	70,000	34,133,069
1984	4,720,596	N/A	14,948,554	270,000	2,065,000	279,500	22,283,650
1985	2,397,600	N/A	6,482,400	- -	270,000	- -	9,150,000
1986	1,847,660	N/A	6,107,084	170,000	790,000	- -	8,914,744
1987	2,523,350	N/A	11,743,711	286,000	1,150,000	31,000	15,734,061
1988	1,208,000	N/A	41,370,600	160,200	2,730,000	- -	45,468,800
1989	3,503,000	N/A	43,205,300	125,000	924,296	5,000	47,762,596
1990	5,282,200	N/A	57,185,394	370,000	321,000	97,000	63,255,594
1991	4,789,500	N/A	34,422,039	92,000	603,000	2,000	39,908,539
1992	1,116,000	3,560,000	25,083,000	25,000	425,000	- -	30,209,000
1993	910,000	5,676,743	23,382,246	163,500	- -	125,000	30,257,489
1994	600,000	8,099,054	18,815,560	225,000	2,554,000	810,000	31,103,614
1995	2,770,000	10,550,000	20,883,100	100,000	- -	3,000	34,306,100
1996	1,100,000	11,983,364	31,238,600	400,000	- -	- -	44,721,964
1997	1,700,000	22,347,000	32,960,500	80,000	720,000	- -	57,807,500
1998	1,000,000	13,727,000	42,441,000	12,000	87,000	- -	57,267,000
1999	3,869,000	3,168,000	44,891,000	1,000	- -	410,000	52,339,000
2000	8,545,000	3,933,000	21,579,000	58,500	- -	736,100	34,851,600
2001	4,810,000	1,977,000	15,820,000	50,000	10,000	1,106,000	23,773,000
2002	1,700,000	5,162,000	17,342,000	185,000	- -	2,113,000	26,502,000
2003	262,000	7,081,000	19,726,000	- -	W	533,000	27,602,000
2004	3,100,000	40,237,000	26,954,000	213,000	50,000	258,000	70,812,000
2005	1,764,000	54,271,000	46,255,000	142,000	- -	1,463,000	103,895,000
2006	5,069,000	81,073,000	89,793,000	20,000	2,394,000	580,000	178,929,000
2007	38,888,000	123,487,500	155,601,400	42,500	7,675,000	3,447,000	329,141,400
2008	30,116,000	163,030,000	134,885,000	- -	W	19,238,000	347,269,000
2009	3,862,715	85,871,529	84,020,531	17,850	W	6,193,518	179,966,143
2010	6,392,519	122,955,321	125,364,382	19,000	6,520,200	3,104,199	264,355,621
TOTAL	**$ 213,625,000**	**$ 768,189,511**	**$ 1,259,615,256**	**$15,595,850**	**$35,867,950**	**$ 40,746,617**	**$ 2,333,640,184**

[a]Polymetallic deposits considered a separate category for the first time in 1992.
[b]Approximately $8.1M spent on platinum-group-element exploration during 2010 ($4.1M in 2009, $3.2M in 2008, $3.0M in 2007, $1.4M in 2006, $4.4M in 2005,$3.4M in 2004, $2.4M in 2003, $650,000 in 2002, $2M in 2001).
[c]Includes uranium, tin, diamonds, magnetite sands, and tantalum.
N/A = Not available.
- - Not reported.
W = Withheld; data included in "Other" column.

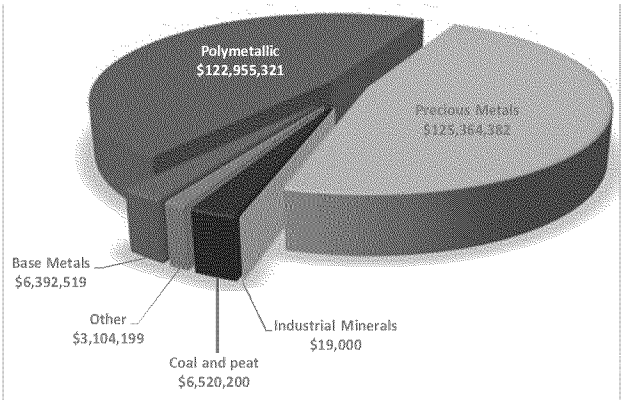


Figure 10. Exploration expenditures in Alaska in 2010 by commodity.

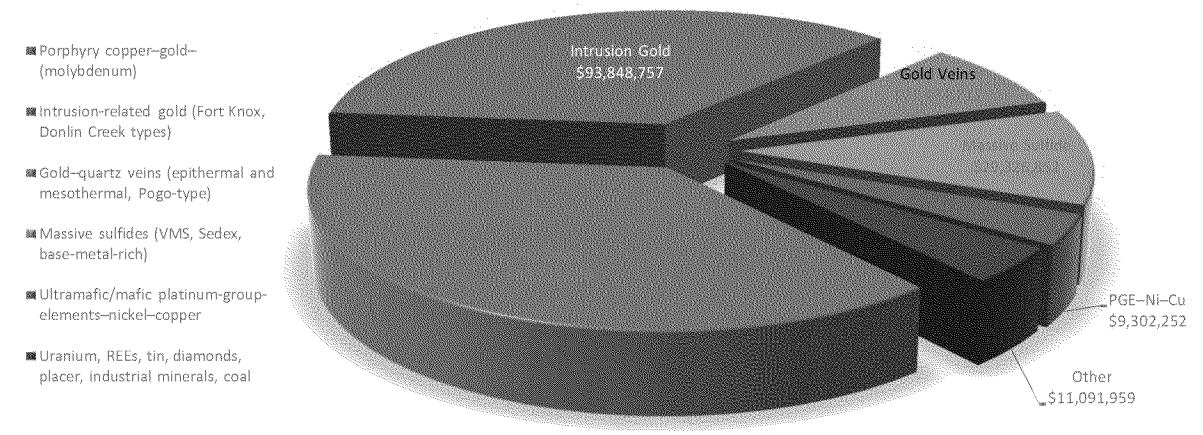


Figure 11. Alaska exploration expenditures in 2010 by deposit type.

spent in 2007. About $8.8 million was spent on PGE–nickel–copper ultramafic-hosted deposits and almost $11.1 million was spent on rare-earth element, diamond, tin, coal, placer gold, and other deposit types, including significant expenditures exploring for iron–titanium-rich beach placer deposits.

Analysis of 2010 mineral exploration expenditures indicates that 37.7 percent were spent for porphyry copper–gold–molybdenum deposits, 35.6 percent of funds were spent exploring for intrusion-related gold deposits, 11.1 percent for various types of massive sulfide deposits, 8.1 percent for gold vein deposits, and the remainder for a wide variety of deposit types. These percentages do not significantly differ from the 2009 values except for the 3.4 percent drop in porphyry deposit expenditures.

Exploration was distributed across Alaska, as shown in table 7, but more than $128 million (or 48 percent of the exploration funds) were spent in southwestern Alaska and nearly $56 million were spent in the Eastern Interior region (fig. 12). Exploration expenditures increased in all regions of the state during 2010, with the sharpest percentage increase (1,314 percent) in the Alaska Peninsula region. The western and southcentral regions during 2010 saw a doubling of exploration expenditures from 2009 levels. Exploration expenditures in the northern region lagged behind all other regions for 2010, increasing 22 percent from 2009 expenditures.

Two advanced exploration projects, Pebble and Donlin Creek, accounted for more than 43 percent of the exploration expenditures in 2010. The Pebble copper–gold porphyry project in southwestern Alaska, with resources of 80.6 billion pounds of copper, 107.4 million ounces of gold, and 5.6 billion pounds of molybdenum, is a joint-venture project of Northern Dynasty Minerals Ltd. and Anglo American PLC, and was the largest exploration project in 2010. The 42.3-million-ounce Donlin Creek intrusion-hosted gold project in southwestern Alaska is a joint venture of Barrick Gold Corp., NovaGold Resources Inc., and Calista Corp.

Other advanced exploration projects include the Niblack volcanogenic massive sulfide project in southeastern Alaska and the Livengood project near Fairbanks in the Eastern Interior region with an announced 12-million-ounce gold resource. Additional advanced projects with defined mineral resources include the Whistler and Lucky Shot projects in the southcentral region, the Ambler and Lik projects in the northern region, and the LWM project in the Eastern Interior region.

Table 7. Reported mineral exploration expenditures and employment in Alaska, 2010.

	Northern	Western	Eastern Interior	South-central	South-western	South-eastern	Alaska Peninsula	Total
				Exploration expenditures				
Placer	$ 153,109	$ 479,941	$ 572,309	$ 188,051	$ 546,450	$ 18,000	$ 567,977	$ 2,525,837
Lode	8,528,748	18,511,138	55,342,779	26,446,443	127,475,563	23,799,809	1,725,304	261,829,783
TOTAL	**$ 8,681,857**	**$ 18,991,079**	**$ 55,915,088**	**$ 26,634,494**	**$ 128,022,013**	**$ 23,817,809**	**$ 2,293,281**	**$ 264,355,620**
				Exploration employment				
Employment workdays	4,732	11,412	41,353	7,842	52,657	15,969	1,329	135,294
Workyears[a]	18	44	159	30	203	61	5	520
Companies reporting[b]	27	48	217	69	32	22	8	423

[a]Based on 260-day workyear.
[b]Some companies were active in several areas.

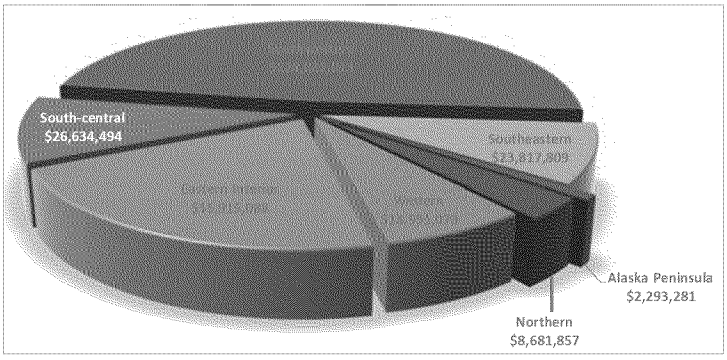


Figure 12. Alaska exploration expendi-tures by region, 2010.

Prospecting sites and mining claims were staked across all regions of Alaska. Table 8 summarizes the number of new and active (new plus existing) mining claims per year, from 1991 through 2010. The table lists the number of 20-acre federal mining claims, 160-acre state prospecting sites, and 40- or 160-acre state mining claims. New mining claims staked during 2010 included 7,578 new state claims (1,082,340 acres), 88 new state prospecting sites (6,400 acres), and 332 new federal claims (6,640 acres). State claim staking increased more than 7 percent from 2009 levels, while the number of new federal mining claims decreased to 31 percent of the claims staked in 2009. The number of active federal claims also decreased about 19 percent from 2009 to 2010. These changes are shown graphically in figure 13.

The amount of land in Alaska under claim increased approximately 16.5 percent from 2009 to 2010, with approximately 4.49 million acres of land covered by claims and prospecting sites in 2010. Alaska had 8,413 active federal and 45,194 active state mining claims in 2010.

The Alaska Division of Geological & Geophysical Surveys (DGGS) conducted geologic mapping and minerals-related studies in the southern part of the Livengood mining district and contracted helicopter-borne geophysical surveys for the Iditarod and Ladue areas of southwestern and eastern Alaska. DGGS Minerals Section geologists also assisted on other mapping projects conducted by DGGS in 2010. Line, grid, vector data, and maps for an airborne geophysical survey of the Moran survey area, Melozitna and Tanana quadrangles, central Alaska, were released in early 2010. Summaries of the products completed under this program, with both State and Federal funding, are provided in tables 9 and 10. Released geologic maps, geophysical data, and Alaska minerals information can be found at http://www.dggs.alaska.gov/ and http://AKGeology.info.

NORTHERN REGION

Zazu Metals Corp. planned to complete a suite of studies on the Lik zinc–lead–silver massive sulfide project. A positive preliminary assessment study was completed by contractor Scott Wilson Roscoe Postle Associates Inc. and identified several areas where the project could be significantly improved, including

Table 8. Summary of claim activity by claim type, 1991–2010.

	State Claims				Prospecting Sites (160 acres)		Federal Claims (20 acre sites)	
Year	New (Active) 40 acre[a]	New (Active) 160 acre	Total (Active) 40 acre[a]	Total (Active) 160 acre	New	Total	New	Total
1991	3,277	0	37,862	0	747	1,723	1,299	23,222
1992	2,640	0	36,250	0	454	1,472	695	20,254
1993	2,120	0	34,340	0	1,412	2,259	601	9,298
1994	4,057	0	34,400	0	802	2,378	341	8,495
1995	4,512	0	30,464	0	1,030	2,725	376	7,766
1996	9,489	0	36,602	0	2,082	3,687	681	9,346
1997	8,678	0	42,836	0	2,480	5,305	1,872	11,320
1998	9,786	0	49,816	0	3,194	7,148	427	11,033
1999	11,978	0	56,107	0	1,755	7,600	308	10,176
2000	4,560	614	54,393	614	1,143	5,675	523	7,805
2001	858	907	49,627	1,503	27	3,091	464	8,248
2002	745	826	44,056	2,179	61	2,138	261	8,100
2003	856	2,603	38,076	4,387	101	1,857	676	8,424
2004	1,070	3,533	34,380	7,719	59	1,484	66	8,313
2005	806	4,502	34,066	11,551	128	1,612	411	7,826
2006	1,111	5,747	33,864	16,249	103	1,646	457	8,068
2007	576	6,031	31,305	20,208	57	1,625	933	8,872
2008	1,333	2,565	23,033	13,519	24	651	3,001	11,732
2009	1,142	2,793	24,340	16,381	40	335	1,057	10,431
2010	1,446	6,132	24,805	20,389	88	441	332	8,413

Updated information provided by James McJimsey (Land Records Information Section, DNR), and Melody Smyth and Julie Capps (U.S. BLM). Table has been reorganized to conform with computer records available after 1990.
[a]Includes claim fractions varying from 1 to 39 acres.

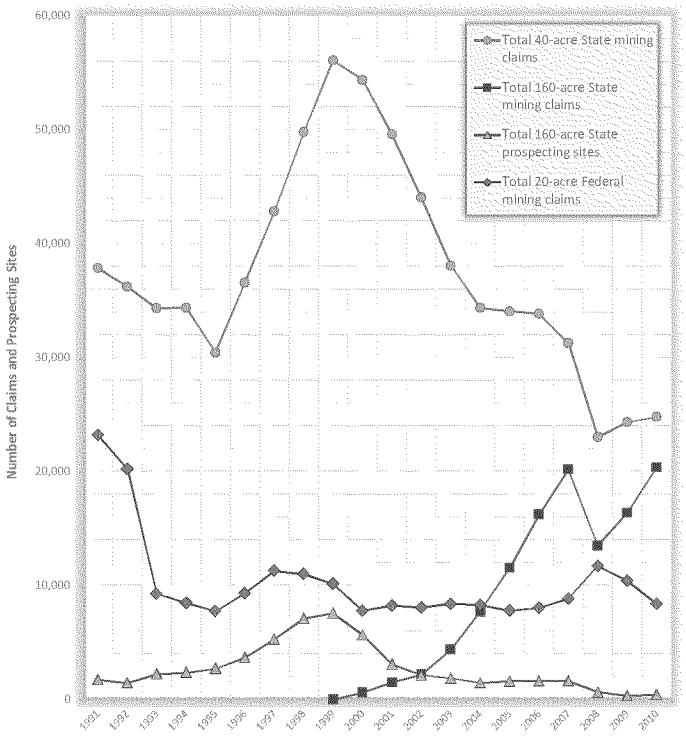


Figure 13. Graph showing total active mining claims in Alaska by claim type.

reducing unit mining costs. Zazu planned to move the project to the pre-feasibility phase after receiving the study results. The Alaska Industrial Development and Export Authority (AIDEA), a public corporation of the State of Alaska, initiated pre-due diligence based on the recent Lik engineering studies. AIDEA may finance building a spur road to the Lik deposit from the De Long Mountain Transportation System that connects the Red Dog Mine to the coast. AIDEA may also finance additional storage and handling facilities at the Chukchi Sea port. The Lik deposit resource estimate includes more than 3.3 billion pounds of zinc, more than 1 billion pounds of lead, and more than 31 million ounces of silver in the indicated category for the Lik South deposit. It also tallied nearly 1.3 billion pounds of zinc, almost 500 million pounds of lead, and nearly 10 million ounces of silver in the inferred resource category for the Lik North and Lik South deposits. The Lik South deposit is suited to open-pit mining methods, according to Zazu, and the Lik North deposit could be mined underground with access from the bottom of the Lik South pit.

Teck Alaska Inc. continued its exploration drilling program for polymetallic sedimentary-hosted massive sulfide deposits in the area surrounding Red Dog Mine. Teck Resources' exploration group conducted geological mapping, geochemical sampling and geophysical surveys. Approximately 380 line-miles of an airborne time-domain electromagnetic geophysical survey, HeliTEM, was flown over the area around and north of the Red Dog Mine. Long-term dewatering of five nearby shallow shale-gas exploration wells also continued. Gas flow tests will be conducted when the formation has been sufficiently dewatered. The flow tests will form the basis for decisions related to the economic feasibility of converting from diesel-fired power to natural gas obtained from the shale formations.

NovaGold Resources Inc. completed the purchase of the Ambler property from Kennecott Exploration Co., with a total price of $29 million for 100 percent interest. NovaGold conducted environmental and engineering studies, including wetlands mapping, water quality, fisheries, and geohazard studies, on the Ambler property, which hosts the high-grade copper–zinc–gold–silver Arctic volcanogenic massive sulfide deposit. NovaGold also consolidated its land package in the area and conducted numerous community meetings.

Silverado Gold Mines Ltd. continued to review data from 2009 work on the Workman's bench section of the Nolan gold–antimony lode property. Additional work was planned for 2011.

No significant exploration was conducted on Goldrich Mining Co.'s Little Squaw Creek property in the Chandalar region. Goldrich concentrated on placer gold mining in 2010, but planned an aggressive lode exploration program in 2011 (photo 1).

TintinaGold Resources Inc. conducted interpretive mapping and high-resolution satellite imagery analysis at the Baird property. An initial drill program is planned for 2011 to test zinc, lead, and copper geochemical anomalies. Samples of scattered gossan float trains and lenses in carbonate contain as much as 1 percent zinc, 0.5 percent lead, and 500 parts per million copper; and samples of silica–barite veins in carbonate assayed as much as 5.3 percent zinc.

BHP Billiton Ltd. completed camp and drill site remediation at the Western Arctic Coal Project under a 5-year exploration agreement with Arctic Slope Regional Corp. The exploration project was terminated in mid-year.

Table 9. Detailed federally funded airborne geophysical survey work as of December 2010[a].

Survey Area	Survey Size	Resulting Products
Wrangell/Stikine[b]	1,111 sq. miles	Airborne geophysical survey
Koyukuk/Wiseman	533 sq. miles	Airborne geophysical survey
Ketchikan[c]	605 sq. miles	Airborne geophysical survey
Aniak	1,240 sq. miles	Airborne geophysical survey
Delta River	603 sq. miles	Airborne geophysical survey
Sleetmute	641 sq. miles	Airborne geophysical survey
Howard Pass–Misheguk Mountain	1,447 sq. miles	Airborne geophysical survey
Western Fortymile	250 sq. miles	Airborne geophysical survey
TOTAL 9 years $4.0 million	**6,430 sq. miles**	**1.1% of Alaska's total area**

[a]Projects funded mainly by U.S. Bureau of Land Management with contributions by DGGS, local and state governments, and private corporations. Projects concentrate mainly on federal land. Data are released through DGGS.
[b]Major funding came from BLM and the City of Wrangell.
[c]Major funding came from BLM and Ketchikan Gateway Borough. Sealaska Corp., Alaska State Mental Health Land Trust Office, the City of Coffman Cove, and the City of Thorne Bay also contributed funds. Sealaska Corp. also contributed previously acquired geophysical data.

Andover Ventures Inc. continued to evaluate results from previous work on the Sun volcanogenic massive sulfide property. Contango acquired 100 percent interest in six rare-earth-element properties across the State of Alaska from Juneau Exploration LP (JEX) for cash and a 3 percent royalty interest. The properties consist of 3,520 acres of unpatented federal mining claims and 97,280 acres of state mining claims. Avalon Development Corp. provided Contango a valuation report on the properties. One of the properties is the Alatna project near the southern edge of the Brooks Range. No work was reported.

Table 10. Detailed state airborne geophysical surveys and follow-up geologic ground-truth mapping as of December 2010[a].

Survey Area	Survey Size	Resulting Products
Nome District western core area	494 sq. miles	Airborne geophysical survey geologic map
Nyac District core area	183 sq. miles	Airborne aeromagnetic survey
Circle District core area	338 sq. miles	Airborne geophysical survey geologic map
Valdez Creek District	78 sq. miles	Airborne geophysical survey
Fairbanks District	626 sq. miles	Airborne geophysical survey geologic map
Richardson District	137 sq. miles	Airborne geophysical survey
Rampart/Manley–Tofty	1,017 sq. miles	Airborne geophysical survey geologic map
Upper Chulitna District	364 sq. miles	Airborne geophysical survey geologic map
Petersville–Collinsville District	415 sq. miles	Airborne geophysical survey geologic map
Iron Creek District	689 sq. miles	Airborne geophysical survey geologic map
Ruby District	591 sq. miles	Airborne geophysical survey/published geologic map[b]
Fortymile District	1,036 sq. miles	Airborne geophysical survey geologic maps
Livengood District	229 sq. miles	Airborne geophysical survey geologic maps (additional fieldwork in 2010)
Salcha River/North Pogo	1,032 sq. miles	Airborne geophysical survey geologic maps
Southeast extension of Salcha River–Pogo	91 sq. miles	Airborne geophysical survey
Liberty Bell	276 sq. miles	Airborne geophysical survey geologic map
Broad Pass	304 sq. miles	Airborne geophysical survey
Council	618 sq. miles	Airborne geophysical survey geologic map
Goodpaster River	210 sq. miles	Airborne geophysical survey geologic mapping (field work completed; map in prep.)
Liscum[c]	67 sq. miles	Airborne geophysical survey
Black Mountain	222 sq. miles	Airborne geophysical survey
East Richardson	224 sq. miles	Airborne geophysical survey
Northeast Fairbanks	404 sq. miles	Airborne geophysical survey geologic mapping (field work completed; map in prep.)
Alaska Highway Corridor[d]	3,045 sq. miles	Airborne geophysical survey geologic mapping (field work completed; map in prep.)
Bonnifield District	602 sq. miles	Airborne geophysical survey geologic mapping (field work completed; map in prep.)
Styx River[e]	710 sq. miles	Airborne geophysical survey
Slate Creek–Slana River	442 sq. miles	Airborne geophysical survey geologic mapping (field work completed; map in prep.)
Moran	653 sq. miles	Airborne geophysical survey
TOTAL 17 years $11.5 million	**15,097 sq. miles**	**2.64% of Alaska's total area**

[a]Projects funded by the Alaska State Legislature. Projects concentrate on state, Native, state-selected, and Native-selected lands and are managed by DGGS.
[b]DGGS published a geologic map of the Ruby–Poorman mining district based on mapping in 1984 by the Anaconda Minerals Co.
[c]Project funded through agreement with AngloGold Ashanti (USA) Exploration Inc.
[d]Project funded by the Alaska State Legislature as a $2 million Capital Improvement Project to assess the geologic hazards and resource potential along the proposed natural gas pipeline corridor between Delta Junction and the Canada border.
[e]Project partially funded through agreement with Anglo American Exploration (USA) Inc. under the DGGS Mineral Industry Sponsorship Program.
Note: Surveys listed above are complete except where noted. Additional areas will be scheduled for surveying at later dates contingent on future funding.

At least 22 individuals and companies reported placer gold exploration activities at various properties across the region. Much of the exploration was conducted in the Wiseman area and consisted of prospecting by panning or small-scale sluicing.

Photo 1. Abundant coarse-grained gold and gold nuggets in a sluicebox on the Lit le Squaw property during 2010. Photo courtesy of Goldrich Mining Co.

WESTERN REGION

Fire River Gold Corp. continued evaluating the Nixon Fork gold–copper project to con firm previous geologic work through re-logging all existing core at the site in conjunction with underground mapping of current workings, re-assaying selective drill intercepts, checking drill hole surveys, and confirming or building a geological model. St. Andrew Goldfields Ltd., the former operator of the Nixon Fork Mine, drilled more than 110 core holes totaling 30,841 feet in 2007 and 2008 and the results were never released. Fire River Gold reviewed the drill data and released geochemical results over the year. Fire River Gold also announced a 65,000-foot drill program, with 39,000 feet of underground drilling and 26,000 feet of surface drilling. Work also confirmed the gold grade of the tailings pond and tested the metallurgy of the ore. Results from 34 drill holes of tailings averaged 0.222 ounces of gold per ton. The tailings are estimated to contain 34,600 ounces of gold. The resource evaluation program continued into 2011.

Fire River Gold calculated a new resource for the Nixon Fork deposit based on 1,233 diamond drill holes from both surface and underground sites and a total of 17,693 samples that were assayed for gold. Indicated resources are 134,140 tons grading 0.78 ounces of gold per ton in the mine, 101,410 tons grading 0.23 ounces of gold per ton in the tailings, and a total of 128,500 ounces of contained gold. Inferred resources are 78,000 tons grading 0.81 ounces of gold per ton in the mine, 52,900 tons grading 0.21 ounces of gold per ton in the tailings, and a total of 74,600 ounces of contained gold. Fire River also contracted Snowden Mining Industry Consultants Inc to complete a preliminary economic assessment study in September for the resumption of underground mining and ore processing at Nixon Fork Mine. The study examined the viability of completing a cyanidation circuit to recover gold from the existing tailings pond and increase overall gold recovery from future mining.

Next Gen Metals Inc. conducted limited fieldwork on the Silver Chalice epithermal gold–silver project near Kaltag. A report on the geology and mineralization at the property was prepared and conformed to National Instrument (NI) 43-101 standards.

TintinaGold Resources Inc. drilled airborne geophysical anomalies on its Kugruk property along the eastern margin of the Kugruk pluton (photo 2). These anomalies include a 1.8-mile-long, very-high-magnetic zone at Billiken; a 1.8-mile-long, low-resistivity zone on the south flank of the Kugruk pluton; and a 3-mile-long, low-resistivity zone with coincident copper-in-soil anomaly in the Knowles Creek area in the south part of the claim block. Drill hole KU10-003 in the Billiken zone encountered 298 feet of copper-rich mineralization in calc-silicate skarn over three intervals grading 0.27 percent copper, 0.002 ounces of gold per ton, 0.082 ounces of silver per ton, and 33.1 percent iron. The hole had an 18.7-foot intercept grading 1.23 percent copper, 0.006 ounces of gold per ton, and 0.204 ounces of silver per ton; and a second interval grading 1.7 percent copper, 0.017 ounces of gold per ton, and 0.817 ounces of silver per ton.

TintinaGold Resources analyzed geological, geophysical, geochemical, and other datasets for the Colorado Creek gold property and planned drilling for 2011. TintinaGold dropped its Omalik property.

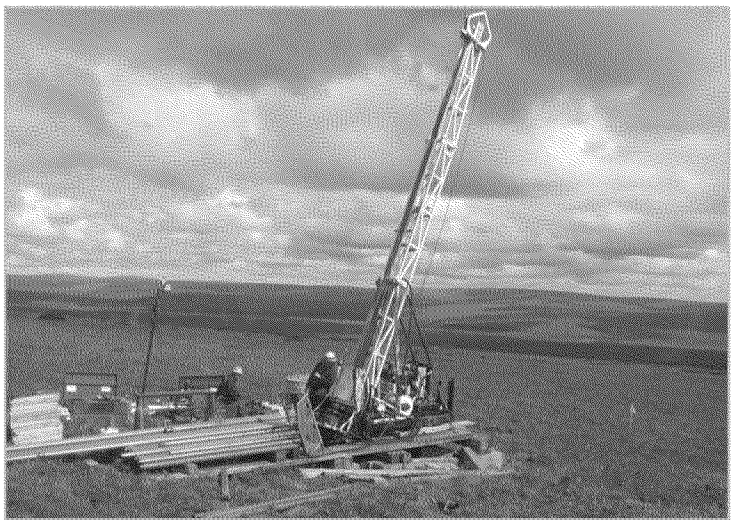


Photo 2. Drilling at the Kugruk project on the northern Seward Peninsula. Photo provided by Tintina Gold Resources Inc.

Millrock Resources Inc. conducted exploration on two projects on the Seward Peninsula during 2010. Kinross Gold Corp. funded the exploration program at the Council project and Valdez Gold Inc., renamed Ryan Gold Corp., funded exploration at the Bluff project after finalizing a cash, stock, and exploration commitment option for up to 75 percent of the Bluff project.

Millrock tested the Daniel's Creek gold zone at the Bluff project with a 24-hole, reverse-circulation drilling program. Fences of short, approximately 425-foot-long holes were completed for a total of 9,150 feet. The Daniel's Creek gold zone was confirmed and extended to a total length of 3,000 feet. The best intersection of the program was in hole BLF2021, with 105 feet, starting at 40-foot depth, grading 0.111 ounces of gold per ton, including a 40-foot intercept grading 0.262 ounces of gold per ton. This intersection is interpreted to be from a previously undiscovered, parallel zone situated at a lower stratigraphic level than the known Daniel's Creek zone. In addition, drill hole BLF2015 intersected 105 feet of gold mineralization, starting at 165-foot depth, grading 0.055 ounces of gold per ton, including 60 feet grading 0.088 ounces of gold per ton.

Millrock conducted exploration at the Council project to drill test coincident gold–arsenic geochemical anomalies in the uplands of a historic placer region at the Albion prospect, to conduct detailed soil surveys as infill programs between existing anomalous regions, and to begin testing the largely underexplored land package with a reconnaissance geochemical survey. Six trenches totaling 1,200 feet were dug in areas with anomalous gold soil geochemical anomalies. Reverse-circulation drilling of 17 holes for a total of 6,765 feet was completed at the Albion prospect. The best results were seen in hole CNL1013, with 15 feet of gold mineralization starting at 275-foot depth and grading 0.041 ounces of gold per ton, and hole CNL1014, with 30 feet of gold mineralization starting at 65-foot depth and grading 0.030 ounces of gold per ton. A total of 1,990 soil samples were taken across the property. The best geochemical result was 334 ppb (parts per billion) gold from an infill survey between the northwest-striking Albion anomaly and an even larger, parallel geochemical anomaly to the northeast. The reconnaissance geochemical survey identified two new areas with anomalous gold up to 150 ppb and anomalous pathfinder elements.

Cedar Mountain Exploration Inc. optioned the Kelly Creek project north of Nome on the Seward Peninsula, staked an additional 147 state mining claims in April, and staked twice more during the year, bringing the project's land package to 164.5 square miles. The property is considered prospective for disseminated gold deposits in metasedimentary rocks. The 2010 exploration program included soil grid surveys and reconnaissance soil sampling, with 1,642 soil samples collected for geochemical analysis. The new geochemical results were merged with data from 1983 and 2007 to make geochemical maps of the Kelly Creek, Wolf, Fox, and Wolverine prospects. The gold and coincident arsenic anomalies at the Kelly Creek prospect are at least 1 mile long and localized within graphitic schist along the Kelly Creek fault. The Fox prospect area includes three strong gold anomalies, with values up to 203 ppb gold, following a schist/marble contact. The Wolf prospect has a gold and coincident arsenic anomaly associated with silicified marble and quartz-veined marble along the high-angle Ruff fault. Gold values are up to 103 ppb, and arsenic values are up to 133.5 ppm. The Wolverine prospect has a 1-mile-long gold and coincident arsenic soil anomaly. The Bear prospect area has a weak gold soil anomaly, but stronger arsenic, antimony, and mercury anomalies associated with a contact between graphitic schist and calcareous metasedimentary rocks. Reconnaissance soil sampling and geochemical results identified anomalous

gold in two areas southeast of the Wolverine prospect—the Moose and Jaeger occurrences.

NANA Regional Corp. conducted exploration in the Fairhaven district of the Seward Peninsula at the Anugi zinc–lead–silver prospect. Geochemical samples were collected and geologic mapping was completed. No results were announced.

Newmont Exploration Ltd. conducted geologic mapping, geochemical sampling including 234 soil samples, and a 10,038-foot drilling program in the Mystery Mountains. Results of these studies were not announced.

Hinterland Metals Inc. dropped its claims on the Windy Fork property, covering two documented rare-earth-element showings, the Windy Fork placer, and the Eudialyte lode prospects.

Western Alaska Copper and Gold Co. continued exploration at the Honker and Roundtop prospects near the formerly producing Illinois Creek Mine. Work included geological mapping, rock geochemical sampling, and collection of a bulk sample for geochemical analysis. Western Alaska Copper and Gold Co. contracted Zonge International Inc. to digitize, reprocess, reinterpret, and remodel 1980-era ground magnetic, horizontal loop electromagnetic, and induced polarization (IP) geophysical data.

At least 28 individuals or companies reported limited placer gold exploration across the region. Most of the operations were on the Seward Peninsula. There was also limited lode exploration for gold in the Kigluaik Mountains; tin at the Win, Won, and Kougarok Mountain prospects; and polymetallic mineralization at the Wheeler, Foster, and Granite Creek prospects.

The Alaska Division of Geological & Geophysical Surveys contracted helicopter-borne geophysical surveys for the Iditarod area of central Alaska. Most of the survey area is part of the Iditarod and Innoko mining districts, which have produced more than 2.3 million ounces of gold; only 3,000 ounces of this production have been from lode sources. Geophysical information being acquired for the Iditarod area includes aeromagnetic and electromagnetic data. Maps and digital data are scheduled to be released as DGGS Geophysical Reports in 2011.

EASTERN INTERIOR REGION

International Tower Hill Mines Ltd. divided into two companies during 2010, with International Tower Hill Mines retaining the Livengood gold project, and Corvus Gold Inc. holding other exploration projects and assets. International Tower Hill Mines Ltd. continued an aggressive exploration drill program on the Livengood project to test new targets and the down-dip projection of known mineralization, with 210 holes totaling 227,208 feet of drilling completed in 2010 (photos 3 and 4). The winter drill program operated four drill rigs and the summer drilling program made use of two core and three reverse-circulation drill rigs. The surface gold geochemical anomaly at Livengood covers an area 3.7 miles long by 1.25 miles wide, of which approximately half has been explored by drilling through the end of 2010. Drilling continued in the Core, Money Knob, Tower, Sunshine, Olive, Lillian, Northwest, and Southwest zones. In addition, drilling was conducted on some targets to the northeast and west of the main deposit area, including Moose Gulch. Positive geochemical results from a regional soil sampling program identified possible reconnaissance drill targets. Environmental baseline sampling program, wetlands mapping, and other related long-term mine permitting projects were also ongoing. Continuing metallurgical studies focused on the potential use of milling, with a flotation-gravity circuit. Initial results indicate recoveries to a concentrate of 89 percent, suggesting the possibility of significant operational and capital cost savings. Test data for conventional whole ore milling with a gravity carbon-in-leach (CIL) system produced initial recoveries of 76 percent.

The Livengood Deposit is hosted in a thrust-interleaved sequence of Proterozoic to Paleozoic metasedimentaryand metavolcanic rocks. Mineralization is related to a 90-million-year-old dike swarm that intrudes through the thrust stack. Primary ore controls are a combination of favorable lithologies and crosscutting structural zones. Selective development of disseminated

Photo 3. A reverse-circulation drill rig on Money Knob. Photo courtesy of International Tower Hill Mines Ltd.

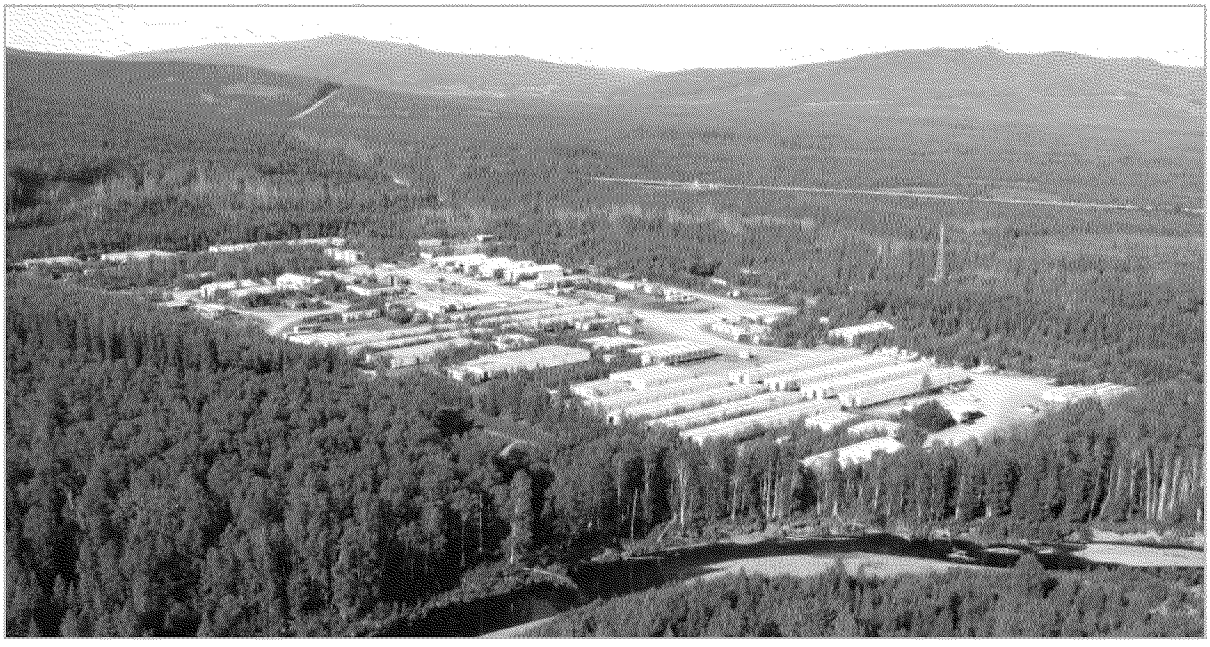


Photo 4. Tower Hill using the old pipeline camp near Livengood for their base of operations on the Livengood project. The Trans-Alaska Pipeline is visible in the near background. Photo by David Szumigala.

mineralization in favorable host rocks is the main ore control in areas distal to the main structural zones. Within the primary structural corridors, all lithologies can be pervasively altered and mineralized. Devonian volcanic rocks and Cretaceous dikes represent the most favorable host lithologies, and are pervasively altered and mineralized throughout the deposit. Two dominant structural controls are present: (1) major shallow, south-dipping faults that host dikes and mineralization and are related to dilatant movement on structures of the original fold-thrust architecture during post-thrusting relaxation, and (2) steep northwest-trending linear zones cutting across all lithologies that focus the higher-grade mineralization. The net result is broad, flat-lying zones of stratabound mineralization around a core zone of more vertically continuous, higher grade mineralization. The deposit geometry results in a lower strip ratio for the overall deposit and higher grade areas in the core of the deposit that could be amenable for starter pit production.

International Tower Hill contracted Reserva International LLC to provide an updated, NI 43-101-compliant, resource estimate for the Livengood project in June 2010 based on 420 drill holes with an average length of 948 feet, and 11 trenches with an average length of 125 feet. The latest resource estimate, at a 0.015 ounce of gold per ton cutoff, has an indicated resource of 450.4 million tons at an average grade of 0.024 ounces of gold per ton (10.9 million ounces) and an inferred resource of 140.1 million tons at an average grade of 0.023 ounces of gold per ton (2.4 million ounces). These resources make the Money Knob deposit one of the largest new gold discoveries in North America. The Core and Sunshine zones account for most of the higher-grade resource, with indicated resources of 222.7 million tons at an average grade of 0.031 ounces of gold per ton (6.9 million ounces) and inferred resources of 44.1 million tons at an average grade of 0.031 ounces of gold per ton (1.3 million ounces), at a 0.020 ounce of gold per ton cutoff. Preliminary economic assessment study results for combined milling and heap-leach processing are quite favorable, yielding a life-of-project annual gold production of 504,000 recovered ounces of gold for 21 years, at a 1:1.07 strip ratio (ore to waste). Using a gold price of $950 per ounce, the conceptual mine would produce a 15.4 percent internal rate of return. Additional economic assessment studies were released concerning various options of mining to refine and improve project economics.

Endurance Gold Corp. staked the Vana and McCord properties in the Livengood mining district based on gold anomalies generated as part of a stream-sediment sampling program conducted and published by the Alaska Division of Geological & Geophysical Surveys. The McCord property consists of 14 Alaska State mineral claims immediately adjoining International Tower Hill Mines Ltd's Livengood property. The Vana property consists of 22 Alaska State mineral claims and is located adjacent to Tolovana Hot Springs Dome, 19 miles southwest of the Livengood property.

Fairbanks Gold Mining Inc., a subsidiary of Kinross Gold Corp., continued ore-body delineation with a drilling program at Fort Knox Mine. The in-pit exploration drilling program targeted ore zones extending northwest of and on the western edge of the current phase 7 mining and extends below current mining. Fairbanks Gold also had an active exploration program in the Fairbanks area. No results were announced.

Fairbanks Gold, in joint venture with Teryl Resources Corp., also continued exploring the Gil property. The goals of the 2010 Gil program were to further delineate the strike extension of the mineralized zones, and to infill between step-out holes, in order to gain a better understanding of ore-zone continuity. Drilling began April 12 and concluded on August 16 (photo 5). The exploration program consisted of 14,977.5 feet of drilling, with 27 reverse-circulation drill holes totaling 9,546 feet, and 11 core holes totaling 5,431.5 feet. Kinross Gold contracted Metallogeny Inc. to perform the exploration at Gil, including managing the drill program, conducting a ground magnetometer survey, trench mapping and sampling, sampling for metallurgical work, and preparing a report, including interpretation, of the results of the 2010 program. G.F. Back Inc. was contracted for the reverse-circulation drilling and Boart Drilling Inc. was contracted for the core drilling. Twenty-two drill holes were completed along Sourdough Ridge, 15 drill holes were completed in the North Gil area, and one core hole was drilled at the Main Gil zone. Drilling expanded the known extent of mineralization along the western perimeter of the North Gil Zone, the southwest extension of the 509 Trend, and the calcsilicate unit located between the Main Gil and North Gil zones. The best drill intercept was in hole GVR10-568 from the North Gil zone, with 35 feet grading 0.0788 ounces of gold per ton starting at 420-foot depth. The best drill intercept from the Sourdough Ridge area was hole GVR10-560, with 25 feet grading 0.0508 ounces of gold per ton starting at 195-foot depth.

Sumitomo Metal Mining Pogo LLC continued exploration at the Pogo Mine property including drilling, aerial photography, airborne Light Detection and Ranging (lidar) and geophysical surveys, and soil sampling of the Pogo property and adjacent ground. The 2010 drilling program focused entirely on drill targets in the immediate Pogo Mine area. Surface drilling completed 76 NQ-size core holes totaling 70,972 feet and was conducted from April 15 through October 21. Exploration construction included 43 drill sites, heli-pads, and one bulldozer road in support of the drilling program. Surface drilling was contracted to Connors Drilling Co. using two CS-1000 fly-rigs. Connors Drilling also did the underground exploration drilling, completing 35 NQ-size core holes totaling 17,745 feet. Underground drilling was carried out intermittently throughout the year and ten holes totaling 5,700 feet were completed by contractor Connors Drilling.

Photo 5. G.F. Back Inc. drill rig at one of the numerous sites drilled in the Fairbanks mining district during 2010. Photo provided by Kinross Gold Corp.

Sumitomo Metal Mining and Stone Boy Inc. contracted Pathfinder Mineral Services to conduct exploration on the Monte Cristo Creek portion of the Stone Boy project. The Japan Oil, Gas, and Metals National Corp. (JOGMEC) was also involved in the joint venture. Work included drilling 11 core holes in 2010 at the Naosi prospect, collection of rock and soil samples for geochemical analysis, at least 196 line-miles of airborne electromagnetic survey, Lidar imagery and interpretation, and high-resolution aerial photography and interpretation. No geochemical results were announced, but most drill holes intersected gently westward-dipping quartz veins up to 16 feet thick with gold, silver, and antimony mineralization.

Alix Resources Corp. signed option agreements in February to acquire 100 percent interest in the Money Rock gold properties near Pogo Mine. Alix Resources completed a soil sampling program on the properties, but no results were announced. In June, Alix Resources signed an option agreement with Precious Metals Exploration Corp. for the Money Rock property. Precious Metals Exploration can acquire 60 percent interest in

the property through this cash, stock, and work commitment agreement.

Western Standard Metals Ltd. signed an option agreement with Freegold Ventures Ltd. in January to earn a 50 percent interest in the Golden Summit property. Western Standard terminated a proposed merger with Freegold and the option agreement on the Golden Summit property by early July. Freegold Ventures Ltd. completed a small ground geophysical program at the Golden Summit project on Cleary Summit near the Fort Knox Mine. The geophysical program focused on finding extensions of near-surface, intrusion-hosted gold mineralization intersected in historic drill holes at the Tolovana–Dolphin prospect.

Hunter Dickinson Acquisitions Inc. optioned the Delta volcanogenic massive sulfide project near Tok from Grayd Resource Corp. in October. The stock, cash, and work commitment agreement gives Hunter Dickinson the option to acquire up to 100 percent interest in the property consisting of 261 mining claims. Hunter Dickinson completed an airborne Versatile Time Domain Electromagnetic (VTEM) geophysical survey over the entire Delta district. Several new targets were identified.

Caribou Copper Resources Ltd. completed nine trenches on the Caribou Dome copper property. Fifty-three rock chip samples were collected across visible copper oxide mineralization, including chrysocolla and malachite in fractures and shears within black shale. All trenches had at least one sample with greater than 1.7 percent copper over 6.5 feet. The highest grade intervals included Trench 11, with 8.2 feet grading 3.78 percent copper, Trench 4 with 23 feet grading 4.03 percent copper and 0.180 ounces of silver per ton, and Trench 5 with 6.5 feet grading 2.96 percent copper and 0.185 ounces of silver per ton. Mineralization was traced for 700 feet across surface and more than 300 feet of vertical relief and primarily contained within two thin black shale-and-limestone horizons in a package of intermediate to mafic volcanic and plutonic rocks.

Contango ORE Inc. holds leasehold interests on approximately 647,000 acres of Alaska Native and 12,000 acres of state mining claims on State of Alaska lands near Tetlin. Contango collected a total of 1,884 rock, soil, pan concentrate, and stream silt samples in 2010 on the Tetlin project. Of this total, 910 samples showed measurable amounts of gold and 54 samples had gold values of 500 ppb gold or higher. Geological mapping was also completed.

Contango also acquired 100 percent interest in six rare-earth-element properties across the State of Alaska from Juneau Exploration LP (JEX) for cash and a 3 percent royalty interest. The properties consist of 3,520 acres of unpatented federal mining claims and 97,280 acres of state mining claims. Avalon Development Corp. provided Contango with a valuation report on the properties. The rare-earth-element properties include the Spooky project in the Ray Mountains and the Wolf project west of Tanana. No work was reported.

Millrock Resources Inc. optioned the Uncle Sam property from Kiska Metals Corp. in 2009. Millrock conducted geochemical sampling in areas of thick loess cover during 2010, but the methods attempted were generally unsuccessful, or where successful, not cost effective. Crescent Resources Corp. executed an agreement with Millrock on December 15 for the option to earn a 100 percent interest in the Uncle Sam property by making cash payments, meeting exploration work commitments totaling $2.5 million, and by issuing Crescent Resources shares to Millrock. A soil auger drill sampling program is planned for 2011, followed by a core drilling program.

Panoramic Resources Ltd. entered into a farm-in agreement with Triton Gold Ltd. and joint-venture partner Tushtena Resources Inc. on the Tushtena gold project near Tok to earn up to 51 percent of the project. Four diamond drill holes were completed for a total length of 5,241 feet. Three drill holes intersected several wide, highly deformed fault zones with alteration but no significant gold mineralization. One drill hole intersected extensive alteration and several thin, potentially high-grade gold quartz veins, with a narrow arsenopyrite–pyrite vein at 614-foot depth, grading 0.062 ounces of gold per ton.

First Star Resources Inc. optioned the LMS gold property from International Tower Hill Mines Ltd. First Star drilled three NC-size core holes totaling 3,618 feet within the Camp Zone area of the property. The drilling program hoped to expand the stratiform gold-bearing graphitic quartzite breccia horizon, and confirm the extent of high-grade gold vein feeder zones in the lower gneiss zone. Highlights of the drilling program include intercepting high-grade gold mineralization in the graphitic quartzite breccia including 62.5 feet grading 0.073 ounces of gold per ton and 0.287 ounces of silver per ton in hole LM-10-39, and 30 feet grading 0.048 ounces of gold per ton and 0.449 ounces of silver per ton and 9.5 feet grading 0.364 ounces of gold per ton and 0.176 ounces of silver per ton in hole LM-10-38. Drill results for the northeast-striking structural corridor include 2.5 feet grading 1.280 ounces of gold per ton and 0.156 ounces of silver per ton; 5.5 feet grading 0.179 ounces of gold per ton; 2.5 feet grading 2.777 ounces of silver per ton in hole LM-10-39; and 5 feet grading 0.127 ounces of gold per ton, and 0.241 ounces of silver per ton in hole LM-10-38.

First Star also optioned the West Pogo project from International Tower Hill Mines. First Star, under contractor Pacific Rim Geological Consulting,

conducted reconnaissance rock chip sampling across a 130-foot-wide mineralized area of rubble crop. The best geochemical result was 0.190 ounces of gold per ton and 0.381 ounces of silver per ton over a 20-foot sample length.

Radius Gold Inc. acquired claims in the Sixtymile placer gold district straddling the Alaska–Yukon border, with about 10 percent of the land package within Alaska. The property consists of 741 Yukon quartz claims and 30 Alaska state claims. Kennecott Exploration Co. had explored the area in the mid 1990s and discovered gold anomalies associated with granitic plutons. Radius Gold completed high-resolution airborne magnetic and radiometric surveys across the property and conducted auger soil sampling in selected locations. Geologic mapping, soil sampling and geophysical results defined a northeast-trending fault zone cutting schist and quartzite overlain by younger andesitic volcanic rocks. A core drilling program was conducted on the western flanks of the Sixtymile River valley in Yukon Territory.

Ashburton Ventures Inc. dropped their claims on the Bullion Hills property in the Circle mining district.

Select Resources Corp., the minerals subsidiary of Tri-Valley Corp., contracted for and received an NI 43-101 compliant technical report on its Shorty Creek gold property in the Livengood area. Avalon Development Corp. based the report on updated geological, geochemical, and geophysical data and concluded that the property has potential for a large copper–gold–molybdenum porphyry system.

Fire River Gold Corp. conducted limited geologic mapping and prospecting on the Draken and Kansas Creek gold properties.

Fairbanks Gold Mining Inc. continued reconnaissance exploration outside of the Fairbanks mining district. Rock and soil sampling continued in the Blackshell Creek area. Fairbanks Gold also collected rock and soil samples in the Porcupine Creek area of the Circle mining district. No results of this work were released.

Full Metal Minerals completed step-out drilling at the LWM polymetallic carbonate-replacement prospect near Chicken, as well as tested new silver-rich occurrences and prospects elsewhere at the Fortymile project. The new drilling extended the strike length of massive carbonate-replacement mineralization at the LWM prospect to more than 3,000 feet. The 2010 drilling program included step-out drilling along strike on 165-foot centers, as well as select infill drilling in 16 core holes, totaling 16,720 feet. To the southwest, step-out hole LWM10-64 intersected multiple zones, including 19.3 feet of true width at 499.7-foot depth averaging 7.38 percent zinc, 13.82 percent lead, 0.09 percent copper, and 5.77 ounces of silver per ton. A multi-element soil anomaly continues to the southeast along the Ketchumstuck fault, which appears to control the replacement mineralization at LWM. Infill hole LWM10-68 intersected 14.44 feet of true width at 371.1-foot depth averaging 23.71 percent zinc, 23.63 percent lead, 0.07 percent copper, and 9.16 ounces of silver per ton. The deposit is open for expansion to the northwest, where difficult drilling conditions from frozen overburden hindered drilling. Hole LWM10-76 hit 4.20 feet of true width at 316.6-foot depth averaging 4.38 percent zinc, 8.74 percent lead, 0.08 percent copper, and 3.53 ounces of silver per ton, which is the northwesternmost hole completed to date on the Fortymile property.

Elsewhere on the Fortymile property, Full Metal completed seven short reconnaissance holes at the Eva, West Eva, and Oscar targets. At Eva, high-grade surface mineralization may occur as a 'chimney' of massive carbonate replacement mineralization that was missed by surface drilling. Drill hole EVA10-01 intersected 3 feet, starting at 177.5 feet, averaging 2.35 percent lead, 1.43 percent zinc and 2.04 ounces of silver per ton, however, other shallow holes did not intersect significant mineralization. At West Eva, broad of zones of anomalous mineralization, particularly silver, were observed within a quartz–carbonate stockwork. No significant mineralization was encountered in drilling at the Oscar prospect.

Full Metal staked multiple claim blocks in eastern Alaska, along interpreted extensions to the White Gold Trend in the Yukon. The Rolling Thunder project covers prospective ground in the Fortymile mining district (photo 6). Soil samples collected from the Pika claims ranged up to 1.09 ppm gold associated with elevated silver values. Geochemical results from two rock samples of gossan from the Pika claims were 0.3 ppm gold and 137.97 ounces of silver per ton, and 0.96 ppm gold and 22.98 ounces of silver per ton. At the McElfish claims, a soil sample contained 0.209 ounces of gold per ton. Soil and rock chip samples from the Willow property assayed up to 0.096 ounces of gold per ton and 2.86 ounces of silver per ton. Geochemical results of rock grab samples from the 20X prospect ranged up to 0.160 ounces of gold per ton.

A surface exploration program was conducted at the Tanacross property. Full Metal entered into an agreement on October 6 with Georgetown Capital Corp., which grants Georgetown's Alaska subsidiary an exclusive right to acquire a 60 percent interest in the Tanacross copper–gold–molybdenum porphyry targets after cash and stock payments and $4 million in work commitments. An initial $500,000 work program involving a three-hole drill program on the Bluff prospect and a soil sampling program on the Oreo prospect was budgeted for the next 6 months.

New Gold Inc. continued working on the Liberty Bell property north of Healy including geologic mapping,

Photo 6. Geologist examining a quartz vein on one of the prospects of the Rolling Thunder project in the Fortymile mining district. Photo courtesy of Full Metal Minerals Inc.

geochemical sampling, and a 9,967-foot core drilling program. Geochemical sampling included whole-rock analysis, U–Pb SHRIMP geochronology, and petrographic analysis. No results were announced. New Gold dropped its option on the Liberty Bell property at year's end.

Millrock Resources Inc. conducted limited soil sampling on three mining claim blocks in the Fortymile mining district. Millrock is targeting disseminated and vein-style intrusion-related lode gold deposits. Results were not announced.

Agnico–Eagle USA Ltd. signed a letter of intent with Miranda Gold Corp. for the Ester Dome project in the Fairbanks mining district. The geology and mineralization on the Ester Dome project is prospective for high-grade vein deposits and shear-hosted gold deposits as well as large tonnage bulk minable gold deposits.

Linux Gold Corp. explored the Trout claims in the Rampart mining district for Fort-Knox-style gold mineralization by collecting nine soil and 46 rock-chip samples. The soil samples contained from 10 to 967 ppb gold and indicated a northeast trend to gold mineralization. Geochemical results from the rock samples ranged up to 411 ppb gold, with samples of quartz-veined igneous rock having the highest gold values.

Linux also optioned the Coho claims, a group of ten claims 30 miles northeast of Pogo Mine. Previous sampling showed gold–bismuth–copper anomalies in schist near a Cretaceous–Tertiary igneous complex.

Rhyolite Resources Ltd. collected 50 rock and 21 soil samples on their seven-claim, Paxson gold property south of Tok. Geochemical results from the rock sampling include 0.258 ounces of gold per ton weighted average from a 23-foot continuous rock-chip sample in the Shalosky zone. Two miles east–southeast of the Shalosky zone, a 9.8-foot continuous rock chip sample in the Low zone assayed 0.390 ounces of gold per ton (weighted average) and at the Hunter prospect, 0.6 miles south–southeast of the Shalosky zone, a rock grab sample assayed 1.48 ounces of gold per ton.

The Alaska Division of Geological & Geophysical Surveys (DGGS) conducted geologic mapping and mineral-related studies in the southern part of the Livengood mining district and contracted helicopter-borne geophysical surveys for the Ladue area along the Alaska–Yukon border. DGGS Minerals Section geologists also assisted on other mapping projects conducted by DGGS in 2010, including work along the Alaska Highway. Line, grid, vector data, and maps for an airborne-geophysical survey of the Moran survey area, Melozitna and Tanana quadrangles, central Alaska, were released early in 2010. Geologic maps, geophysical data, and Alaska minerals information can be found at ht pt//www.dggs.alaska.gov/ and ht pt//AKGeology.info.

Minor placer gold exploration activities, including prospecting, trenching, drilling, and geophysical surveys, were reported by 144 individuals and companies, and work was performed in most mining districts across the region. Minor lode exploration was conducted in the region by 35 individuals, partly to fulfill annual labor requirements to maintain mining claims in good standing.

SOUTHCENTRAL REGION

Full Metal Minerals Ltd. and Harmony Gold Corp. continued exploring the Lucky Shot gold property. Ongoing engineering studies and environmental monitoring were completed by Harmony Gold and Full Metal Minerals throughout the year. Harmony Gold terminated its Lucky Shot option with Full Metal on November 18.

Full Metal Minerals optioned the Grizzly Butte property from Kennecott Exploration Co. and staked an additional 220 claims to make a 317 mining claim land holding. A 2,133-foot drill program, surface sampling, and IP geophysical program were completed on the property. No significant results were realized during the exploration program. Full Metal terminated the option agreement by November.

Kiska Metals Corp. conducted an 11-hole, 13,862-foot drilling program at the Whistler project in the spring to test widely spaced geophysical targets from a

2009 induced polarization (IP) geophysical survey and to fulfill terms of a back-in agreement with Kennecott Exploration Ltd. (photo 7). Porphyry-related alteration was observed in hole WH10-004 at Raintree North, hole WH10-006 at Red North, and holes WH10-005 and WH10-007 at the Spur area. Porphyry-style alteration and copper–gold mineralization in sheeted to stockwork quartz–chalcopyrite–pyrite veins hosted in andesitic volcanic rocks was intersected in hole WH10-008 at the new Raintree East prospect 2 miles northeast of the Whistler prospect. Hole WH10-08 intersected 295 feet of mineralization starting at 492-foot depth, with grades of 0.1 percent copper, 0.012 ounces of gold per ton, and 0.038 ounces of silver per ton. The final phase of the trigger program for the back-in agreement began in early June with a seven-hole, 6,529-foot drilling program including three holes drilled at Island Mountain, two holes at Round Mountain and two holes on reconnaissance targets in the Whistler Orbit area. A technical report on work conducted for the back-in agreement was delivered to and reviewed by Kennecott. Kennecott did not exercise their right to a back-in on the Whistler project, but they retain a 2 percent net smelter royalty.

Kiska continued exploration at various targets at the Whistler project (photo 8). Five holes totaling 14,620 feet were drilled in the Whistler resource area. The five drill holes had mineralization and alteration indicating potential to expand the Whistle copper and gold resource. Three holes totaling 3,583 feet were drilled at the Raintree West prospect. Best results of drilling at the Raintree West target included drill hole WH1-024 with 272.3 feet of mineralization grading 0.06 percent copper, 0.035 ounces of gold per ton, 0.334 ounces of silver per ton, 0.53 percent lead, and 1.08 percent zinc. Nine holes totaling 12,917 feet were drilled at the Island Mountain prospect.

Drilling at Island Mountain targeted the north and south strike extensions of mineralization discovered in 2009. Mineralization was extended 825 feet further along strike by drilling. Highlights of the drill results include a Breccia zone intersection of 0.034 ounces of gold per ton, 0.070 ounces of silver per ton and 0.23 percent copper over 177 feet and a "Lower zone" intercept of 0.030 ounces of gold per ton over 182 feet. Hole IM10-13 intersected 377 feet of mineralization grading 0.23 percent copper, 0.036 ounces of gold per ton, and 0.117 ounces of silver per ton. The 2010 exploration program at Island Mountain included detailed mapping and soil and rock sampling, which identified several new breccia outcrops over a half-mile by about quarter-mile area. In addition, strongly pyrrhotite mineralized diorites (comparable to Lower zone mineralization) were also noted over large areas. Initial metallurgical studies were carried out on gold–copper mineralization from Island Mountain by G&T Metallurgical Labs in Kamloops B.C., Canada. Tests on two composite samples utilizing

Photo 7. Kiska's spring drilling program was successful because of good weather and competent support services, including helicopter transport. Photo courtesy of Kiska Metals Corp.

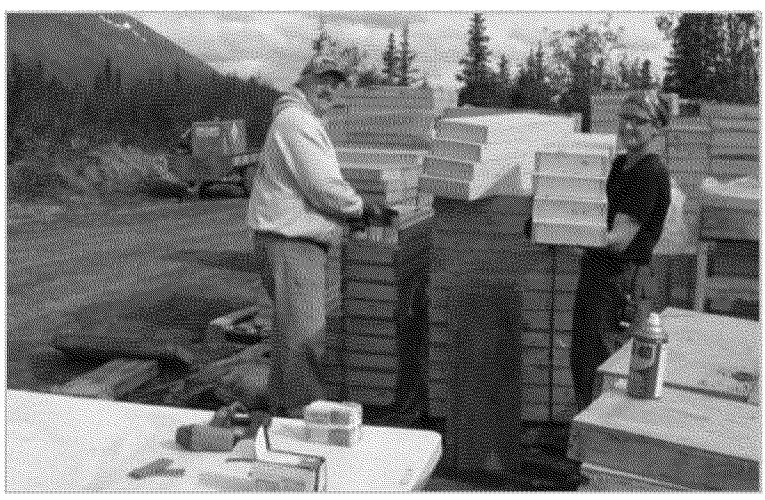


Photo 8. Core boxes stacked and ready for further processing at Kistler's camp near Rainy Pass. Photo courtesy of Kiska Metals Corp.

open circuit flotation followed by cyanide leaching of flotation tailings returned average copper concentrates grading 23 percent copper with recoveries averaging 67 percent for copper and 82 percent for gold.

Kiska signed a nonbinding letter of intent on May 13 with Kennecott Exploration Co. to acquire a 100 percent interest in the Copper Joe property in a cash and work commitment deal. Copper Joe is a copper–gold–molybdenum porphyry prospect 30 miles south–southwest of the Whistler project near the headwaters of the Styx River. A five-week program was completed on the property in August, consisting of approximately 12.9 line-miles of two-dimensional IP geophysics, 9.2 line-miles of ground magnetic geophysics, soil and rock geochemical surveys, and surface mapping. Bedrock and alteration geologic mapping was completed at 1:5,000 scale. Thirty one rock samples were collected over the property; 105 channel samples were collected from a mineralized zone in the main prospect area; 30 stream-sediment samples were collected from the property and surrounding drainages; and 555 soil samples were collected in a grid over the main prospect area.

Pure Nickel Inc., in collaboration with its project partner, Itochu Corp., completed 21,983 feet of drilling in nine core holes on the Man nickel–platinum-group-element (PGE) exploration project. The 2010 exploration at Man included a helicopter-supported two-drill program and extensive geophysical surveys. The drilling was contracted to Cyr Drilling International Ltd. Six holes were drilled at the Alpha Complex and six holes in the southern Beta Complex. Analysis of more than 3,400 assays from the drill program revealed stratigraphic horizons in the Alpha and Beta complexes with elevated platinum and palladium values. Two discrete PGE-enriched horizons were identified at the Alpha Complex, with the shallowest and thinnest PGE horizon, approximately 39 feet thick, intersected at approximately 350 feet below surface and correlated in drill holes PNI-10-028, PNI-10-033, PNI-10-035, and PNI-10-036 over a strike length of 1.65 miles. Narrow intercepts of high-grade nickel–copper mineralization were also encountered in holes PNI-10-028 and PNI-10-035, with grades up to 3.42 percent nickel and 4.27 percent copper. Several drill holes (PNI-10-028, PNI-10-029, PNI-10-030, PNI-10-033, PNI-10-035, and PNI-10-036) encountered multiple disseminated sulfide zones ranging from 48.9 feet to 458.5 feet in thickness, with disseminated mineralization grading up to 0.23 percent nickel and 0.4 percent copper. Pure Nickel said the 2010 discoveries strongly suggest that stratiform PGE mineralization is present and appears to be similar to other PGE-bearing complexes elsewhere in the world. Laterally extensive platinum and palladium cyclic patterns have been recognized over a distance greater than 1.7 miles in the Alpha complex, and share common features with the large, layered intrusions of Bushveld, South Africa, and Stillwater, USA, complexes. The company plans to focus on exploring the PGE-enriched horizons in 2011.

Millrock Resources Inc. prospected and sampled on the Estelle intrusion-related gold property east of the Whistler project. Teck Ltd. entered into an exploration agreement with Millrock, provided funding for the project, and in late 2010 optioned the property for a 65 percent interest. Geochemical results from rock-chip sampling revealed numerous intervals of anomalous gold mineralization at the Shoeshine prospect. Best results were from a 90-foot interval averaging 0.265 ounces of gold per ton. An induced polarization anomaly was detected on two reconnaissance lines north of the Oxide Ridge gold showing. The chargeability anomaly is estimated to be at 820-foot depth and is favorably situated beneath a large geochemical anomaly. Teck approved an exploration budget of $3.4 million for Estelle in 2011.

Millrock staked the St. Eugene and Monte Cristo properties in February as a result of Millrock's 2009 Kahiltna prospecting program, which produced a number of new surface gold and copper discoveries. Millrock exploration crews discovered additional mineralization between the two claim blocks, and staked 21 additional, intervening claims that joined the two original blocks together. The combined properties were renamed Cristo property. The Cristo project comprises 328 claims. Millrock collected 170 soil samples and 59 rock samples. Millrock's field team identified porphyritic intrusive rocks containing anomalous gold values in rock and soil over a distance of 1 mile. Soil samples ranged up to 400 ppb gold and averaged 86 ppb gold from 22 samples. Rock assays ranged up to 0.122 ounces of gold per ton and averaged 0.014 ounces of gold per ton from 17 samples. The target at the east end of the Cristo project is a large-tonnage, intrusion-related, gold-rich porphyry deposit. At the west end of the project, the claims host a copper–gold–molybdenum porphyry system initially discovered in the 1970s, but recent glacial retreat exposed more prospective ground. Work on the west end of the Cristo property resulted in the delineation of a 2,300-foot strike length of copper and gold mineralization with rock samples assaying greater than 1 percent copper and 0.015 ounces of gold per ton in carbonate-altered hornfels. The work showed that there are multiple styles of mineralization including stockwork, quartz–carbonate veining, chalcopyrite and copper oxide staining, clay alteration, and strong iron staining.

Millrock staked 36 claims in January in the Rainy Pass area. The Revelation property targets a large-tonnage, intrusion-related gold deposit. Large stream and soil geochemical anomalies occur in the area and indicate that the mineralized zone extends under the

receding glacial coverage. Millrock carried out limited mapping and sampling to better demonstrate the extent of the mineralization and alteration system. Several zones of anomalous copper and gold mineralization were identified.

Brixton Metals Corp. staked more than 531 mining claims near Millrock's Estelle property. Brixton also signed an option to earn a 100 percent interest in the Cristo property with a cash, stock, and work commitment agreement.

Corvus Gold Inc., with funding from joint-venture partner Ocean Park Ventures Corp., conducted an aggressive exploration program on the Chisna gold–copper property in the Chistochina mining district for porphyry copper type deposits. Two gold prospects, Golden Range and Southwest Grubstake, were discovered through rock and soil sampling. Work on the Golden Range prospect included 176 soil samples, with 71 samples containing more than 100 parts per billion gold. More than 300 rock samples were collected over the target in a highly gossanous, iron–carbonate-altered sequence of volcanic rocks following a northwest-trending structural zone covering a 5-mile by 1-mile area. The best rock geochemical result was 1.47 ounces of gold per ton. New high-grade gold mineralization was discovered along a series of en-echelon quartz–dolomite–barite veins on the southwestern side of the existing Grubstake porphyry target. The polymetallic quartz veins range in width from 8 inches to 6.5 feet wide and occur along a mile-long, northeast-striking trend. A total of 19 rock samples averaged 0.215 ounces of gold per ton, 0.257 ounces of silver per ton, 0.91 percent lead, and 0.16 percent zinc, with highest results of 1.356 ounces of gold per ton, 0.869 ounces of gold per ton, 4.22 percent lead, and 1.22 percent zinc.

Corvus Gold also completed 4,161 line-miles of Z-Axis Tipper Electromagnetic (ZTEM) airborne geophysical and 62 line-miles of 3D induced polarization and magnetotelluric ground geophysical surveys. More than a dozen targets were defined by these surveys, geological mapping, and surface prospecting. The POW and Grubstake prospects were drilled. Drill holes GS-10-01 and GS-10-03 encountered significant intervals of potassic alteration and veining with chalcopyrite mineralization. Hole GS-10-01 targeted a highly anomalous area of soils and encountered more than 650 feet of copper mineralization grading 0.08 percent copper and 0.002 ounces of gold per ton hosted in volcanic rocks and intrusive breccias with extensive zoned porphyry-type alteration before a fault terminated the zone. Hole GS-10-03 encountered 426 feet of altered and mineralized rock averaging 0.2 percent copper and 0.004 ounces of gold per ton beginning at 626 foot depth. Drill holes GS-10-02, GS-10-04, GS-10-05, and GS-10-06 at the Grubstake prospect encountered pyritic porphyry-related alteration but did not intersect significant mineralized intervals. Drilling at the POW prospect intersected north-dipping copper–gold mineralization in drill holes POW-10-01 and POW-10-02. Drill hole POW-10-01 encountered an oxidized and variable faulted mineralized 78-foot-wide interval averaging 0.13 percent copper, 0.005 ounces of gold per ton, and 0.082 ounces of silver per ton beginning at 184-foot depth. Drill hole POW-10-02 encountered 75 feet of mineralization starting at 292-foot depth and averaging 0.38 percent copper, 0.013 ounces of gold per ton, and 0.219 ounces of silver per ton.

Fire River Gold dropped their option on the Golden Zone property. Alix Resources Corp. entered into a cash, stock, and work commitment option agreement in October with Hidefield Gold Ltd. and Mines Trust Co. to acquire up to a 70 percent interest in the Golden Zone intrusion-associated gold–silver–copper property. Alix Resources contracted Norwest Corp. to compile a NI 43-101 report to update the resource model and resource estimate for the property. The report, to be released in early 2011, will help direct the 2011 exploration program.

Usibelli Coal Mine Inc. planned exploration work at the Wishbone Hill coal property near Sutton. An access road was required from the Glenn Highway to the western part of the coal lease area. The Matanuska–Susitna Borough granted Usibelli a 25-year lease to 60 acres of land for the access road. Six exploration drill holes and bulk sampling of a trench were completed (photos 9–11). Usibelli estimates that approximately one-half million tons of bituminous coal are buried near the surface in the western portion of the coal lease area.

Stone Horn Ridge LLC, a partnership between Cook Inlet Region Inc. (CIRI) and Laurus Energy Inc., began work on the Stone Horn Ridge underground coal gas-

Photo 9. Usibelli's exploration program at Wishbone Hill included bulk sampling of the coal for coal quality testing. Photo provided by Usibelli Coal Mine Inc.

Photo 10. Usibelli trenching coal seams on the Wishbone Hill property as part of an exploration program. Photo provided by Usibelli Coal Mine Inc.

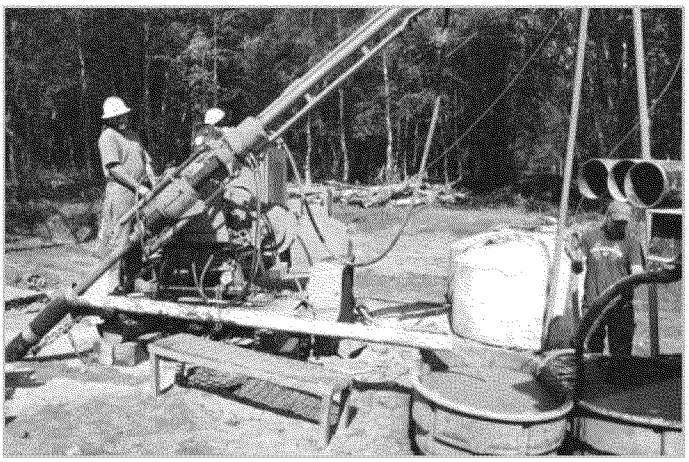


Photo 11. Drilling bituminous coal seams at Wishbone Hill. Photo courtesy of Usibelli Coal Mine Inc.

ification project. The project on CIRI land on the west side of Cook Inlet north of the Beluga River is designed to produce syngas from coal, without mining, to fuel a 100-megawatt combined cycle power plant to supply electricity for southcentral Alaska electricity consumers. CIRI completed five drill holes for a total drilling program of 10,601 feet. Results were not announced.

Tyonek Native Corp. signed a memorandum of understanding with Accelergy Corp. for a coal-to-liquids project on the west side of Cook Inlet aimed at turning the area's plentiful coal into jet fuel.

Teryl Resources Corp. staked 23 mineral claims adjacent to the Whistler project. Teryl also optioned a 50 percent interest in 11 State of Alaska mining claims prospective for gold and silver in the same area. A sampling program was completed on the recently optioned claims, but geochemical results were not announced.

Geohedral LLC did not conduct any work in 2010 on claims staked for black sand deposits along the shore of the Gulf of Alaska near Yakutat.

Diamond Gold Corp. continued exploration for diamonds, pebble opal, garnet, agate, and gold in the Yenlo Hills. Diamond Gold modified a portable placer gold wash plant for gemstone recovery and used the plant in exploration. Diamond Gold reported identifying two miles of ancestral Lake Creek and conducting work along the ancestral channel.

Shulin Lake Mining conducted a ground magnetometer survey and compiled and interpreted airborne magnetic data for locating future drill holes to search for lode diamond deposits near Talkeetna.

Limited placer gold exploration was reported by 41 individuals or companies in the region. Small-scale lode exploration was also reported at the Lichen claims, Monarch Mine, Hercules and Big Four Mines, Afognak Island, Grubstake Gulch, Nugget Creek, Red Creek, Beaver Creek, and Goldbug claims.

SOUTHWESTERN REGION

Donlin Creek LLC approved an approximately $47 million budget in 2010 for the Donlin Creek intrusion-related gold project. Donlin Creek LLC continued studies for a potential underground 12-inch-diameter natural gas pipeline from Cook Inlet to the project site. The 2010 work program completed the majority of the environmental and engineering studies required to

review the option of using natural gas as the primary power source for the proposed mine project (photo 12). Donlin Creek LLC had discussions with major gas suppliers and contracted an energy consultant to lead natural gas line studies. Donlin Creek LLC worked with multiple regulatory agencies, consultants, and contractors to complete the field studies along the proposed 315-mile pipeline corridor (photo 13). A nine-person Alaska Native crew with three drill rigs and two helicopters trekked the pipeline corridor from Cook Inlet to Donlin Creek. Using a special brine-chilled drilling method to preserve permafrost, drill samples were collected along the corridor to identify geotechnical and trenching conditions for the buried pipeline. Work continued on a prefeasibility study and revising that study to include the natural gas power option. The feasibility study was expected to be completed by mid 2011. No exploration activities were conducted in 2010 in the Donlin Creek resource area.

Photo 12. Danny Twitchell measuring stream flow as part of the ongoing environmental studies for the Donlin Creek project. Photo courtesy of Donlin Creek LLC.

On March 22, 2010, NovaGold Resources announced updated reserve/resource estimates for the Donlin Creek project. Proven reserves are 7.7 million tons grading 0.072 ounces of gold per ton with 0.55 million ounces of contained gold. Probable reserves are 507.7 million tons grading 0.065 ounces of gold per ton with 33.04 million ounces of contained gold. Measured resources are 0.2 million tons grading 0.193 ounces of gold per ton with 0.04 million ounces of contained gold. Indicated resources are 43.6 million tons grading 0.097 ounces of gold per ton with 4.25 million ounces of contained gold. Inferred resources are 64.4 million tons grading 0.069 ounces of gold per ton with 4.41 million ounces of contained gold. Total gold reserves are 33.59 million ounces, while total reserves and resources are 42.29 million ounces of gold. The reserve/resource estimate was completed by an independent engineering firm under the supervision of the Donlin Creek LLC using a gold price of $825 per ounce. The Donlin Creek reserve/resource estimate incorporates results from 62 new drill holes totaling 82,333 feet for total drilling in the reserve/resource model of 1,740 drill holes totaling 1,213,970 feet. The new pit model uses similar parameters to the resource model used in the 2009 Donlin Creek feasibility study.

In March 2010, Donlin Creek LLC renegotiated its lease with Calista Corp., securing additional land to allow for future expansion and extending the lease to 2031. In addition to the 49,261 acres leased from Calista, Donlin Creek LLC holds 242 Alaska State mining claims comprising 31,740 acres, bringing the total land package to 81,361 acres. The existing lease covers the subsurface rights for the entire Donlin Creek mineral reserves and resources.

Donlin Creek LLC also conducted exploration on claims surrounding the Donlin Creek deposit. The Donlin, Grouse, and Eagle claims are accessed via helicopter and work included 63 rock, 337 soil, and 52 stream-sediment samples. An inclined 999.5-foot core hole was drilled on the Grouse claims and an inclined 1,078.6-foot core hole was drilled on the Eagle claims. Geochemical results were not announced.

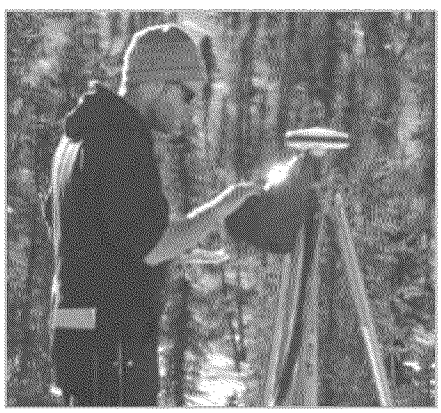


Photo 13. Cal Craig surveying drill sites at Anaconda Creek. Photo provided by Donlin Creek LLC.

The Pebble copper–gold–molybdenum project remained the largest exploration project in Alaska. Northern Dynasty Minerals Ltd. reported that the Pebble Partnership spent $73 million on the Pebble project in 2010, with $21 million spent on engineering studies, $28 million on drilling, and $24 million on environmental and socioeconomic studies. Environmental studies continued to provide

baseline data. The drilling program on the Pebble property concentrated on areas outside of the mineral resource. One drill rig conducted condemnation drilling north of the deposit and a second rig explored other geochemical and geophysical anomalies southwest of the deposit. The project's prefeasibility study is expected to be completed in 2012. Northern Dynasty announced an updated mineral resource estimate for the Pebble deposit in February. The new Pebble resource estimate is based on 509 core holes, including 37 new holes drilled since mid 2008. At a 0.3 percent copper equivalent cut-off grade, the Pebble deposit includes measured resources of 580.9 million tons grading 0.33 percent copper, 0.010 ounces of gold per ton, and 178 ppm molybdenum, indicated resources of 5.97 billion tons grading 0.43 percent copper, 0.010 ounces of gold per ton, and 257 ppm molybdenum, and inferred resources of 5.33 billion tons grading 0.24 percent copper, 0.007 ounces of gold per ton, and 215 ppm molybdenum. Measured and indicated resources total 55.0 billion pounds of copper, 66.9 million ounces of gold, and 3.28 billion pounds of molybdenum. Inferred resources total 25.6 billion pounds of copper, 40.4 million ounces of gold, and 2.29 billion pounds of molybdenum. The global resource total is 80.6 billion pounds of copper, 107.3 million ounces of gold, and 5.75 billion pounds of molybdenum.

The Pebble Limited Partnership flew a Z-Axis Tipper Electromagnetic System (ZTEM) and magnetic helicopter-borne geophysical survey over the Pebble property and some optioned adjacent properties, including the PEBA, PEBB, PEBE, PEBF, SILL, KAS, South Pebble, SP, and KAK mining claims. The Pebble Partnership also completed 13 seismic lines totaling 91,468 feet. A helicopter-supported mini excavator was used to dig 106 shallow soil test pits.

The Pebble Limited Partnership optioned Full Metal's Pebble South property in September. The option agreement required Pebble to spend $3 million on exploration and make cash payments of $150,000 over three years to earn a 60 percent interest in the property. Pebble completed a ZTEM geophysical survey over the property prior to the option agreement.

Liberty Star contracted Geotech Ltd. in 2009 to fly a ZTEM helicopter-borne geophysical survey over the Big Chunk porphyry copper property. The survey consisted of 780 line-miles of ZTEM with 825-foot line spacing and very detailed airborne magnetic survey. In May 2010 Liberty Star received a report from Geotech Ltd. that its interpretation showed not less than 6 to 7 signatures that are consistent with porphyry copper responses. The 2D model shows a typical low responsive area, which could correspond to an ore mineral core zone with a surrounding responsive cylinder representing a pyrite halo typical of porphyry systems. Northern Dynasty paid for two rotary holes to be drilled on the claims by Foundex Pacific under the supervision of Knight Piesold Engineering. Liberty Star's Bonanza Hills claims were also kept in good standing.

Northern Dynasty Minerals Ltd. entered into a binding letter agreement on June 29 with Liberty Star Uranium & Metals Corp. and its subsidiary, Big Chunk Corp., to purchase 95 state mineral claims west of the Pebble project for $1 million and a loan advance of $3 million. Northern Dynasty flew a ZTEM and magnetic helicopter-borne geophysical survey over the claims.

Newmont Exploration Ltd. conducted exploration across southwestern and western Alaska. Extensive work including geologic mapping and soil and rock sampling was completed on several mining claim blocks. Newmont geologists collected 234 soil samples on the Hoss and Mysti claims in the Mystery Mountains. Newmont also conducted IP geophysical surveys totaling 7.5 line-miles, collected 612 soil and 67 rock samples for geochemical analysis and conducted reconnaissance geologic mapping on the Fortyseven Creek gold property. Work on the Dome property southwest of Aniak included 9 line-miles of IP geophysical survey, 939 soil and 83 rock samples collected for geochemical analysis, and reconnaissance geologic mapping.

Western Standard Metals Ltd. signed an option agreement with Freegold Ventures Ltd. on January 21 to earn a 50 percent interest in the Vinasale property. Western Standard terminated a proposed merger with Freegold and the option agreement on the Vinasale property by early July. Freegold completed an exploration program at Vinasale, including drilling six core holes for a total of 6,386 feet. The drilling tested weak geophysical anomalies northeast of known mineralization at the Central zone. Three holes intersected gold mineralization. Hole VM10-01 had a14-foot interval starting at 658-foot depth grading 0.12 ounces of gold per ton. Hole VM10-02 had multiple mineralized intercepts, with the highest grade intercept extending 20 feet from a start depth of 657 feet and grading 0.16 ounces of gold per ton, and the longest intercept starting at 747 feet and continuing to 931 foot depth for a 184-foot length grading 0.075 ounces of gold per ton. Hole VM10-06 had three mineralized intercepts, with the best intercept 118.5 feet long, starting at 447-foot depth, and grading 0.068 ounces of gold per ton.

Terra Gold Corp. signed a cash, stock, and work commitment option with Corvus Gold Inc. to earn a 51 percent interest in the Terra gold property. Terra Gold relogged drill core, conducted geochemical sampling, and hand dug 70 feet of one of the high-grade quartz–gold veins on the property.

Following a geochemical survey, Millrock staked 266 state mining claims at the Humble project near Koliganek to cover a core area of ground that bears

many geological and geochemical similarities to those observed at the Pebble deposit. Kinross made an agreement with Millrock that would see the major company spend up to $10 million on exploration and development to earn a 75 percent interest. A very large ZTEM magnetic airborne geophysical survey was flown and, as a result, many more claims were staked to cover the targets identified. Millrock and Kinross are planning exploration programs for 2011.

Contango acquired 100 percent interest in six rare-earth-element properties across the state of Alaska from Juneau Exploration LP (JEX) for cash and a 3 percent royalty interest. The properties consist of 3,520 acres of unpatented federal mining claims and 97,280 acres of state mining claims. Avalon Development Corp. provided Contango with a valuation report on the properties. The rare-earth-element projects include the Swift project on an east tributary to the Swift River. No work was reported.

Nyac Gold LLC conducted lode gold exploration while placer mining in the Nyac area. Trenching and geochemical sampling were conducted at the head of Nugget Creek. Core drilling took place at the headwaters of Bonanza and Rocky creeks during 2009 and 2010, totaling 13,442 feet. At least 13 holes were drilled in 2010 and drill footage exceeded 4,700 feet. The best mineralized intercept from the 2010 drilling was in hole NYC10-06, with 3.7 feet grading 0.172 ounces of gold per ton from 534.2 to 537.9 footage. The longest mineralized intercept was in hole NYC10-08, with 88.9 feet grading 0.010 ounces of gold per ton from 9 to 97.9 feet deep.

Calista Corp. also conducted geological mapping and geochemical sampling on their lands near Nyac; results were not announced.

Kennecott Exploration Co., in partnership with Alaska Earth Sciences, conducted exploration on the Groundhog claims near Iliamna.

TNR Gold Corp. purchased NovaGold Resources' 50 percent interest in the Shotgun intrusion-related gold project, thereby securing a 100 percent interest in the property.

Blackpeak LLC continued evaluating the Quicksilver Prospect in the Kilbuck Mountains. Results were not announced for PIMA® (portable infrared mineral analysis) hyperspectral analysis of 100 rock samples.

North Fork Resources Pty Ltd, signed a cash and work commitment option agreement on January 27, 2010, to purchase and/or earn up to 90 percent interest in seven claim groups held by Gold Crest Mines Inc. through its wholly owned subsidiaries, Kisa Gold Mining, Inc. and Golden Lynx, LLC. Geologic mapping and geochemical sampling of rocks were initiated on the Kisa, Luna, AKO, Little Swift, and Gold Creek claim groups. No work was done on the Gold Lake and Gossan Valley claim groups. North Fork optioned the Chilly claim group from Gold Crest later in the year. North Fork also conducted geologic mapping and geochemical sampling on the Kipchuk and Flat Top claim groups.

XS Platinum Ltd. continued to evaluate the tailings from past platinum-mining operations in the Goodnews Bay area. The XSP multi-year sampling program conducted by Watts, Griffis, and McQuat (WGM) included a drill program using a 10-inch drill. More than 200 holes were drilled during the 2010 mining season in order to identify new production targets and to expand the existing resource in keeping with NI 43-101 standards. Sample preparation and geochemical analysis were not completed in 2010 and no results were reported. WGM reported the average value of the contained metal analysis for the non-magnetic fraction of the tailings tested in 2008 as 0.0258 ounces of platinum per ton.

Four individuals or companies reported placer gold exploration work in the southwestern region. Ben Porterfield also reported bedrock trenching on Ben's Vein on the Terra property.

SOUTHEASTERN REGION

Coeur Alaska Inc. continued mapping, sampling, and core drilling in an effort to discover new mineralization and expand ore reserves at the Kensington Mine (photo 14). Closely spaced definition drilling continued

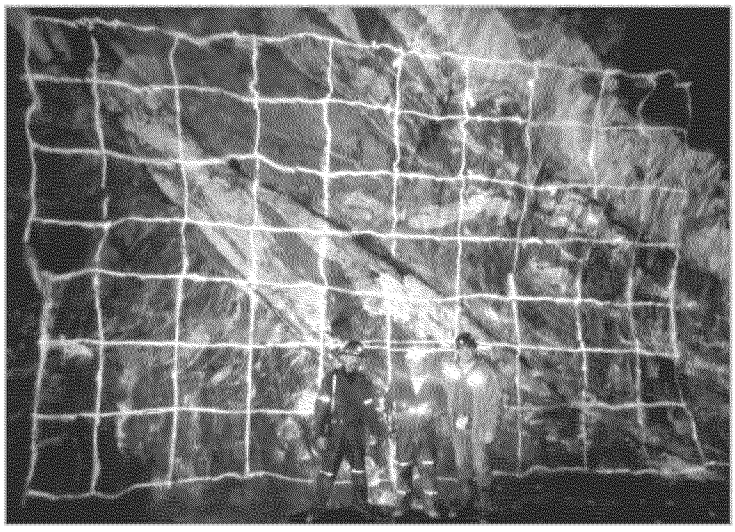


Photo 14. Extensive gold-bearing quartz vein swarm at Ore Zone 41 at the 1290 Level, Kensington Mine. Photo provided by Coeur Alaska Inc.

in areas slated for mining in 2010 and 2011. Exploration drilling at Kensington totaled 21,539 feet and mainly focused on the Horrible Vein, which Coeur renamed the Raven Vein, a prominent, gold-bearing quartz vein and vein-swarmed structure about 2,100 feet west of the current Kensington mining area. Favorable results were obtained from many of the 35 drill holes on the Raven Vein, including 6.5 feet of 2.39 ounces of gold per ton from hole H10-016, 3.9 feet of 0.907 ounces of gold per ton from hole H10-029, 3.5 feet of 1.069 ounces of gold per ton from hole H10-031, 7.2 feet, starting at 291.0 feet deep, of 0.61 ounces of gold per ton from hole H10-039, 9.7 feet, starting at 306.3 feet deep, of 0.68 ounces of gold per ton from hole H10-046, and 16.5 feet, starting at 295.9 feet deep, of 0.37 ounces of gold per ton in hole H10-049. Many of the drill holes cut multiple quartz veins, typical of the mineralization style seen at the nearby Kensington ore body (photo 15). Drilling also identified gold mineralization in the Kimberly vein. Follow-up drilling is planned for 2011.

Hecla Mining Co. completed 58,300 feet of exploration drilling at Greens Creek Mine, with underground drilling totaling 30,800 feet and surface drilling totaling 27,500 feet. The drilling tested the peripheries of known zones including the 5250, Deep 200 South and the Northwest West–South zones in the mine. The Greens Creek deposit is a polymetallic, stratiform, massive sulfide deposit. The host rock consists of predominantly marine sedimentary, and mafic to ultramafic volcanic and plutonic rocks, which have been subjected to multiple periods of deformation. These deformational episodes have imposed intense tectonic fabrics on the rocks. Mineralization occurs discontinuously along the contact between a structural hanging wall of quartz–mica–carbonate phyllite and a structural footwall of graphitic and calcareous argillite. Major sulfide minerals are pyrite, sphalerite, galena, and tetrahedrite/tennanite.

Underground exploration at Greens Creek Mine included continued development of the 1147 exploration drift to provide a staging platform for future drill testing for the southward extensions of the 5250 South and 200 South ore zones. Encouraging drilling results from both targets include a 4.2-foot intersection grading 37.6 ounces of silver per ton in the 5250 zone, and a 14-foot drill interval of massive sulfide along the southwestern extent of the 200 South zone that further extends the resource. Other 200 South zone results included a 13-foot section of massive sulfide that graded 0.25 ounces of gold per ton, 2.1 ounces of silver per ton, 2.1 percent lead, and 23.3 percent zinc, while other holes intersected 12- to 30-foot-wide intervals of baritic ores and silicified argillite with elevated silver grades.

Definition and exploration drilling of the Northwest West zone in the northern part of Greens Creek Mine defined and extended two distinct limbs of a major folded orebody for more than 400 feet down dip. Variable widths of massive sulfide up to 42 feet were intersected on the two limbs of the fold. The drill intercepts contain higher-than-expected grades of precious metals such as 0.72 ounces of gold per ton and 75.6 ounces of silver per ton with base metals over 2.6 feet. Good drill results from the Northwest West and 200 South zones lead Hecla to believe that new reserves and resources could be outlined over time.

Hecla's surface drill program on the Greens Creek project began in late May to systematically evaluate a series of targets including the northern and eastern projections of the northeast mine contact and the Killer Creek gossans. Surface drilling of the mine contact to the north at Upper Killer Creek and East Ridge found sulfide

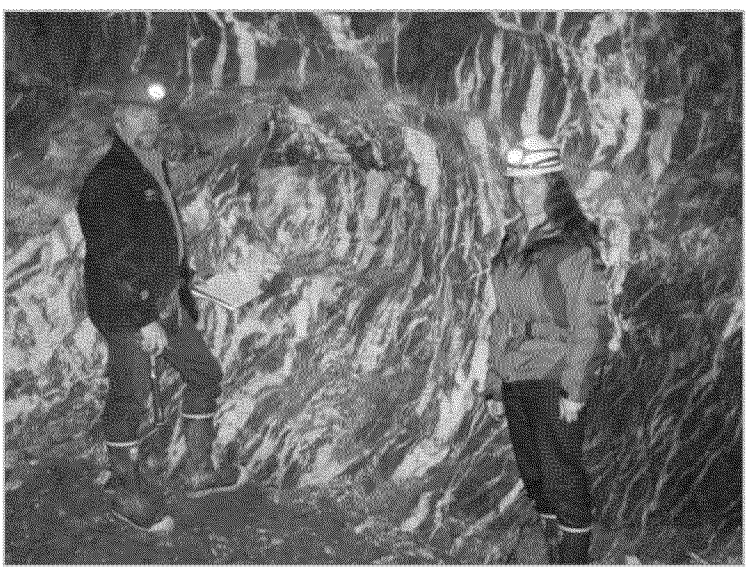


Photo 15. Typical example of gold-bearing quartz vein swarm at the Kensington Mine. Photo provided by Coeur Alaska Inc.

concentrations along the contact, but results were not announced. Surface and underground drilling continued to define the northeast contact, which represents a continuation of the Greens Creek mine contact. However, the northeast contact has been folded underneath the current workings and to the east. Recent drilling defined mineralized intervals along the northeast contact, which has a folded strike length of more than 5,000 feet and down dip extension of 3,000 feet.

Constantine Metal Resources Ltd. announced an inferred resource of 5.24 million tons grading 1.84 percent copper, 4.57 percent zinc, 0.008 ounces of gold per ton, and 0.849 ounces of silver per ton for the Palmer volcanogenic massive sulfide project. The resource for the RW and South Wall zones is based on 46 core drill holes completed up to the end of the 2009 season. Constantine completed a 10-hole, 13,180-foot drill program at the Palmer project in 2010 (photo 16). Drill holes CMR10-33 to CMR10-42 were completed in the Glacier Creek prospect area and the program successfully expanded known extents of RW and South Wall zone mineralization. RW zone step-out hole CMR10-35 expanded observed RW zone mineralization 147 feet along strike to the northwest and intersected 23.3 feet grading 2.10 percent copper, 1.52 percent zinc, 0.005 ounces of gold per ton, and 0.490 ounces of silver per ton. Hole CMR10-38 intersected 33.3 feet of RW zone mineralization grading 0.70 percent copper, 6.51 percent zinc, 1.02 percent lead, 0.011 ounces of gold per ton, and 2.616 ounces of silver per ton that is underlain by 44.8 feet of precious metal-rich, base metal leached oxide zone mineralization grading 0.033 ounces of gold per ton and 4.317 ounces of silver per ton. On the South Wall, Hole CMR10-40 expanded South Wall zone I mineralization 262 feet along strike to the east, intersecting 68.2 feet grading 1.03 percent copper, 5.01 percent zinc, 0.004 ounces of gold per ton and 0.330 ounces of silver per ton. Hole CMR10-40 also intersected a wide interval of South Wall zone III mineralization, with 57.1 feet grading 0.16 percent copper and 2.25 percent zinc, and extends zone III mineralization 164 feet east and 82 feet down dip. Hole CMR10-39 expanded South Wall zone III mineralization 361 feet down plunge to the west with an 8.0 foot intersection grading 1.10 percent copper, 4.52 percent zinc, 0.004 ounces of gold per ton and 0.723 ounces of silver per ton. Downhole electromagnetic surveys were conducted on six of the ten holes drilled in 2010. An electromagnetic survey totaling approximately 23 line-miles covered areas immediately along trend from the 4.54 million ton inferred resource, as well as the Mount Henry Clay prospect.

Photo 16. Well-protected drill rig on a snow-covered ridge at the Palmer project near Haines. Photo courtesy of Constantine Metal Resources Ltd.

Heatherdale Resources Ltd. completed $15 million in exploration costs required to retain its 51 percent interest in the Niblack Project in southeastern Alaska. Pursuant to the June 2009 agreement with Niblack Mineral Development Inc. (formerly CBR Gold Corp.), Heatherdale was required to spend $15 million on exploration activities within three years to retain a 51 percent interest. Heatherdale has rapidly advanced drilling and site investigations of the precious-metals-enriched volcanogenic massive sulfide project to achieve this milestone in approximately 17 months. Two underground diamond drill rigs were focused on delineating the copper–gold–silver–zinc mineral body at the Lookout zone, one of six known VMS deposits in the Niblack project. More than 91,800 feet of drilling was completed through the end of 2010 (photo 17). Numerous drill holes intersected VMS mineralization. Drilling results include hole U064 with 28.4 feet of 2.12 percent copper, 0.043 ounces of gold per ton, 2.01 percent zinc, and 0.875 ounces of silver per ton; hole U081 with 30.0 feet of 1.84 percent copper, 0.074 ounces of gold per ton, 10.9 percent zinc, and 1.49 ounces of silver per ton; hole U083 with 47.0 feet of 1.74 percent copper, 0.109 ounces of gold per ton, 2.47 percent zinc, and 2.188 ounces of silver per ton; hole U090 with 43.97 feet of 1.51 percent copper, 0.050 ounces of gold per ton, 4.73 percent zinc, and 0.758 ounces of silver per ton; hole U095 with 15.09 feet of 2.44 percent copper, 0.081 ounces of gold per ton, 1.65 percent zinc, and 1.867 ounces of silver per ton; and hole U103 with 38.39 feet of 3.76 percent copper, 0.156 ounces of gold per ton, 14.33 percent zinc, and

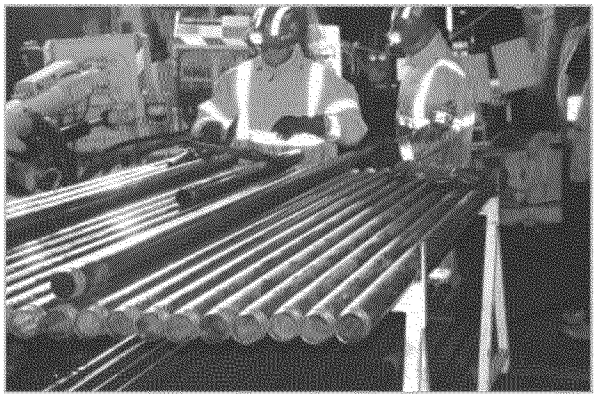


Photo 17. An extensive underground drilling program at Niblack kept the drill crews busy. Photo provided by Heatherdale Resources Ltd.

3.237 ounces of silver per ton. Drilling results indicated that mineralization occurs as stacked sequences of replacement and massive sulfide zones and confirmed a reinterpretation of the geologic model that projected VMS mineralization continuing to the southeast toward a zone of soil samples with up to 2 percent copper. Heatherdale staked additional federal mining claims to cover the projected trend of mineralization. Heatherdale also notified Niblack Mineral Development Inc. of its election to earn an additional 9 percent ownership interest.

Ucore Rare Metals Inc. continued work on the Bokan–Dotson Ridge rare-earth-element (REE) property at Bokan Mountain near Ketchikan. Mineralization consists of multiple subparallel REE-bearing peralkaline dikes and veins localized by shear zones collectively comprising a steeply-dipping mineralized plane (photo 18). Ucore developed a conceptual deposit model for REE mineralization at the I&L and Dotson shear zones over a 1.5-mile strike length and projected to a 650-foot depth. The model generated an estimated 3.0 to 5.6 million tons at a prospective grade range of 0.50 percent to 0.92 percent total rare-earth oxides, with heavy rare-earth oxides comprising about 60 percent of the total rare-earth concentrations in the targeted areas. In addition, the zones contain significant estimated concentrations of non-REE metals, including zirconium, tantalum, niobium, and beryllium. Ucore conducted an 18-hole, 12,369-foot drilling program at Bokan Mountain focused on REE mineralization (photo 19). Thirteen infill holes were drilled in the Dotson zone in order to confirm continuity of REE ore zones from year 2009 results and to test the mineralization at greater depth. Hole LM10-82 was drilled in the center of the Dotson zone to test mineralization at depth and between drill sections. Holes LM10-83 to LM10-86 were drilled at the west end of the Dotson area. To supplement the drilling, 45 trenches were channel sampled along the Dotson zone. At the Sunday Lake zone to the north of Bokan Mountain, three holes were drilled to test mineralization along the intrusive contact of the Bokan complex, and two reconnaissance holes were completed within the Geoduck zone to the south of Kendrick Bay. Geochemical results from trenching have mineralized intercepts ranging from 4.66 to 23.62 feet and grading from 0.328 to 2.13 percent total rare-earth oxides and heavy rare-earth oxides (Europium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, and Yttrium) from 24.6 to 67.0 percent of the total rare-earth oxides. Significant drilling results include hole LM10-76 with 6.50 feet grading 1.48 percent total rare-earth oxides and 0.65 percent heavy rare-earth oxides, hole LM10-77 with 6.17 feet grading 1.72 percent total rare-earth oxides and 0.89 percent heavy rare-earth oxides, hole LM10-80 with 6.04 feet grading 1.71 percent total rare-earth oxides and 0.66 percent heavy rare-earth oxides, hole LM10-82 with 11.94 feet grading 0.79 percent total rare-earth oxides and 0.33 percent heavy rare-earth oxides; hole LM10-83 with 1 foot grading 0.88 percent total rare-earth oxides and 0.19 percent heavy rare-earth oxides; hole LM10-84 with 0.33 feet grading 1.65 percent total rare-earth oxides and 0.93 percent heavy rare-earth oxides; hole LM10-85 with 0.43 feet grading 0.87 percent total rare-earth oxides and 0.57 percent heavy rare-earth oxides; hole LM10-86 with 0.3 feet grading 1.14 percent total rare-earth oxides and 0.73 percent heavy rare-earth oxides; and hole LM10-91 at Geoduck with 1 foot grading

Photo 18. A series of REE-bearing veins and pegmatite dikes at the Bokan Mountain property. Photo provided by Ucore Rare Metals Inc.

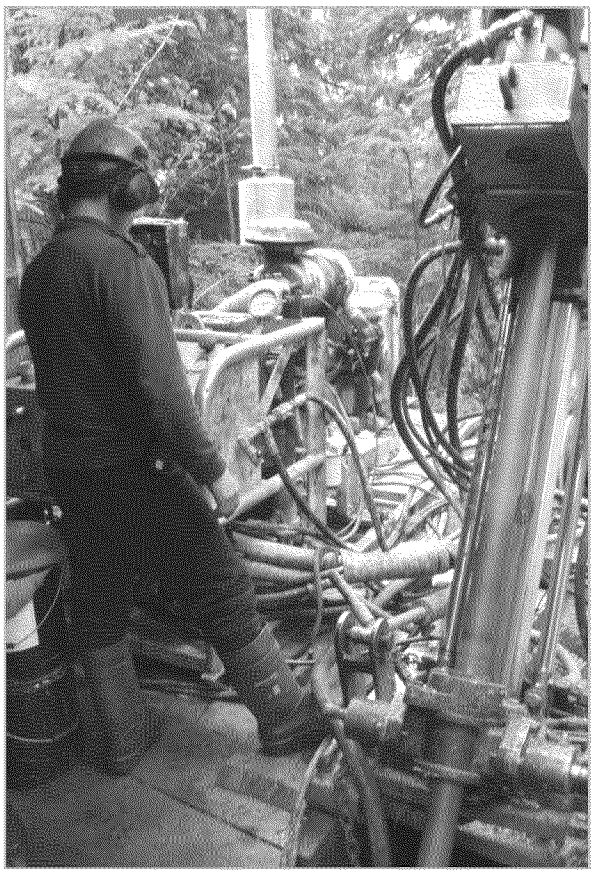


Photo 19. Drilling for extensions of REE mineralization at the Bokan Mountain property, near Ketchikan. Photo courtesy of Ucore Rare Metals Inc.

1.17 percent total rare-earth oxides and 0.16 percent heavy rare-earth oxides. All of the above drill holes had multiple mineralized intercepts. Drill results from the three Sunday Lake holes were below 0.6 percent total rare-earth oxides. Ucore collected representative bulk samples of REE-mineralized material and shipped the sample to Hazen Research Inc. for mineralogical and metallurgical research.

Copper Ridge Explorations Inc. carried out a surface mapping and sampling program over the core of the main Marquis prospect on the Duke Island copper–nickel–platinum–palladium property. Copper Ridge completed a 5,000-foot drilling program of the highest-priority targets at the Marquis prospect. Drilling determined that the conductive anomaly observed at the Marquis showing was caused by pyrrhotite and graphite in gabbro. The best intervals of copper mineralization were from 408.2 feet to 452.1 feet, with 47.9 feet grading 1,476 ppm copper and 392 ppm nickel and from 559.1 feet to 575.2 feet with 16.1 feet grading 2,937 ppm copper and 751 ppm nickel.

Grande Portage Resources Ltd. completed a drill program on the Herbert Glacier project near Juneau after optioning the property from Quaterra Resources Inc. The option agreement allowed Grande Portage to receive an initial 51 percent interest in the property. Core One Enterprises LLC was contracted to conduct the approximately 6,500-foot core drill program. Core One drilled 16 NQ-size core holes from five drill sites. Drilling encountered ribboned, mesothermal-style quartz veins with visible free gold and small concentrations of arsenopyrite, pyrite, galena, sphalerite, and scheelite; and sulfidized shear zones in every hole. Highlights of the drilling included hole 10C-1 at the Main Vein, with 2.82 feet of quartz vein from 292 feet to 294.82 feet grading 0.18 ounces of gold per ton and 5.28 feet of quartz vein from 391.39 feet to 396.67 feet grading 0.376 ounces of gold per ton Main Vein; hole 10D-2 at the Main Vein, with a quartz vein intercept of 3.77 feet from 441.26 feet to 445.03 feet grading 0.191 ounces of gold per ton; hole 10E-1 intersected a 1.71-foot-thick quartz vein at 168.02 foot depth grading 0.187 ounces of gold per ton, and the Deep Trench Vein from 264.58 feet to 266.25 feet grading 0.248 ounces of gold per ton; and hole 10A-7 intersected 2.33 feet of the Ridge Vein from 177.67 feet to 180.00 feet grading 0.331 ounces of gold per ton.

Contango acquired 100 percent interest in six rare-earth-element properties across Alaska from Juneau Exploration LP (JEX) for cash and a 3 percent royalty interest. The properties consist of 3,520 acres of unpatented federal mining claims and 97,280 acres of state mining claims. Avalon Development Corp. provided Contango a valuation report on the properties. The rare-earth-element projects include the Salmon Bay project on the northeastern coast of Prince of Wales Island and the Stone Rock Bay project on the southeast coast of Prince of Wales Island. No work was reported.

Pan Global Resources Inc., formerly Mosam Capital Corp., discontinued its option agreement with Full Metal Minerals for the Mount Andrew property, including the historical Mount Andrew Mine. Altair Ventures Inc. terminated its option agreement with Full Metal for the CJ gold property.

Three individuals or companies reported limited placer gold exploration. Four individuals or companies reported limited lode gold exploration activities.

ALASKA PENINSULA REGION

Full Metal Minerals was very active in the Alaska Peninsula region during 2010. During spring 2010, Full Metal amended the exploration agreement with option to lease previously signed in 2007 with the Aleut Corp., an Alaskan Native regional corporation, to acquire 100 percent interest in mineral rights covering the

Pyramid porphyry copper project. In spring 2010, Full Metal and Shumagin Corp., an Alaska Native village corporation, signed a letter outlining terms of agreement between the companies for a mining exploration agreement and option to lease. On July 15, 2010, Full Metal and TDX Pyramid LLC, an affiliate of an Alaska Native village corporation, signed an exploration agreement with option to lease covering surface lands at the Pyramid property. Full Metal then optioned the Pyramid property to Antofagasta Minerals PLC for a cash and work commitment agreement that makes staged control from an initial 51 percent interest to a possible 80 percent interest if a feasibility study is funded by Antofagasta. A drilling program totaling 5,473 feet in five HQ-size core holes was completed in 2010 (photo 20). All holes encountered chalcocite, chalcopyrite, and molybdenite mineralization over long intervals, starting at surface, in mostly quartz diorite porphyry and quartz feldspar porphyry intrusions. The 2010 drill program covered a 3,000-foot (east–west) by 2,450-foot (north–south) area. Copper mineralization has been traced on surface, coupled with current and historic drilling over an approximate 1.2-mile by 0.62-mile area, and is open in all directions and to depth. Hole PY10-01 intersected 1,534.1 feet of mineralization starting at 105.98-foot depth and grading 0.272 percent copper, 0.002 ounces of gold per ton, and 0.019 percent molybdenum. Hole PY10-02 intersected 1,155.1 feet of mineralization starting at 15-foot depth and grading 0.343 percent copper, 0.002 ounces of gold per ton, and 0.008 percent molybdenum. Hole PY10-03 intersected 975.4 feet of mineralization starting at 28.5-foot depth and grading 0.197 percent copper, 0.001 ounces of gold per ton, and 0.004 percent molybdenum. Hole PY10-04 intersected 948.2 feet of mineralization starting at 31.8-foot depth and grading 0.299 percent copper, 0.002 ounces of gold per ton, and 0.032 percent molybdenum. Hole PY10-05 intersected 639.1 feet of mineralization starting at 21-foot depth and grading 0.63 percent copper, 0.004 ounces of gold per ton, and 0.018 percent molybdenum.

Trinity Metals Corp. Ltd. evaluated magnetite-rich beach sands on Trinity Island. A drill program supervised by Apex Geoscience Ltd., Edmonton, Alberta, Canada, was contracted to Discovery Drilling of Anchorage in late 2009. Approximately 30 holes were drilled up to 45 feet deep to reach bedrock. Mineralogical and metallurgical evaluation of the drill samples for precious metals, heavy minerals, and rare-earth elements was supervised by Minusnine Geoconsult of Calgary, Alberta, Canada.

Advanced Explorations Inc. optioned the Alaska Sands project near Port Heiden in November for a 100 percent interest with a cash, stock, and work commitment agreement with 7th Sea Holding Company LLC. A composite sands sample taken during an initial site visit returned a result of 8.23 percent Fe_2O_3, which compares favorably to other iron sands projects. Advanced Explorations planned to implement a more systematic sampling and auger drilling program to better characterize the tonnage and grade potential of the beach sands.

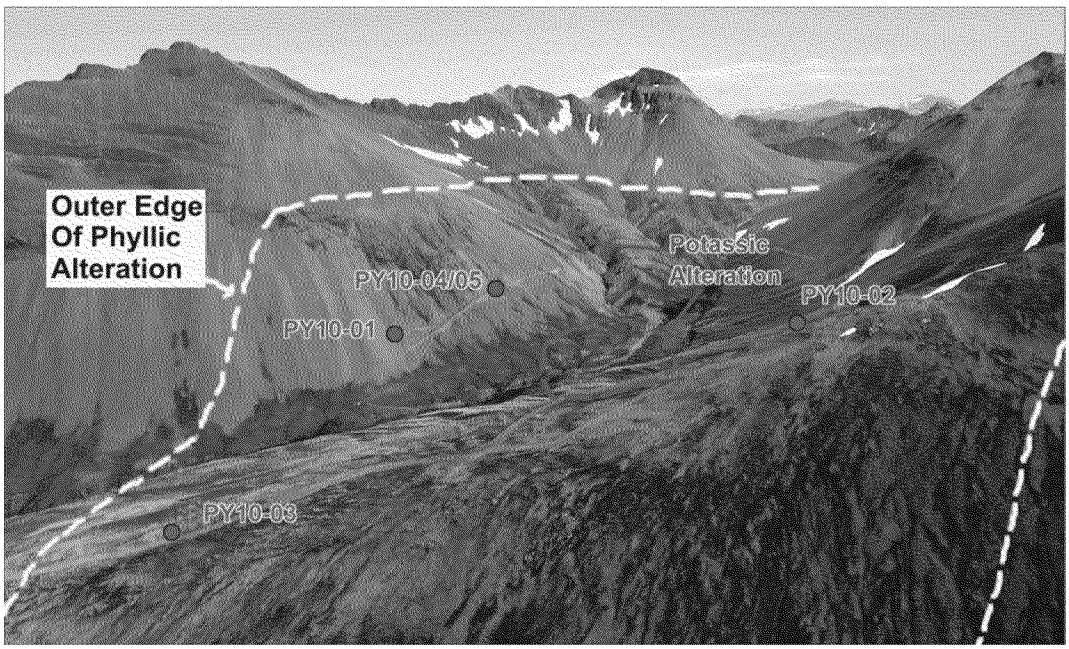


Photo 20. Extensive porphyry-style alteration is present across the surface of the Pyramid property. Photo provided by Full Metal Minerals Inc.

DEVELOPMENT

The development sector of the mining process, as used in this report, refers to building infrastructure or activities that facilitate production of mineral products. Development expenditures refer to actual expenditures at mines as well as sustaining capital. Sustaining capital includes equipment replacement and rebuilding, facility upgrades, and other expenditures that must be amortized or depreciated in accordance with tax laws.

Reported and estimated development expenditures in 2010 were approximately $293.3 million, an 11 percent decrease from the 2009 value of $330.8 million. A total of 25 projects reported development expenditures for 2010. Significant development expenditures were noted at Red Dog Mine, Fort Knox Mine, Pogo Mine, Rock Creek Mine, Greens Creek Mine, Kensington Mine, and the Chuitna coal project. Based on expenditures, Kensington Mine was the largest mineral development project in Alaska in 2010. The Chuitna coal project continued the permitting process. Ongoing capital maintenance and development expenditures continued at Pogo, Fort Knox, Greens Creek, Red Dog, and Usibelli mines. NovaGold Resources' Rock Creek Mine near Nome has remained in care and maintenance status since late 2008. Placer mines across Alaska also reported maintenance and development expenditures. Development employment in 2010 was estimated at 537 full-time-equivalent employees, almost a 45 percent increase from the estimated 371 full-time-equivalent employees in 2009.

Table 11 shows development investment and regional employment; figure 14 graphically portrays 2010 development expenditures by region. Table 12 compares investment by commodity in 2010 with that of the previous 27 years. Figure 15 shows the locations of selected development projects. Development activity was reported in all regions except the Alaska Peninsula region. Figure 16 graphs mineral development expenditures by commodity, from 1982 through 2010.

NORTHERN REGION

Total development expenditures in the region in 2010 amounted to $42 million, reported by five projects—Teck Cominco at Red Dog Mine plus four placer operations—a 40 percent increase from the $30 million spent on development in this region in 2009. Total full-time-equivalentemployment associated with these expenditures for 2010 was 54 positions.

Table 11. Reported mineral development expenditures and employment in Alaska by commodity and region, 2010.

	Northern	Western	Eastern Interior	South-central	South-western	South-eastern	Alaska Peninsula	Total
Development Expenditures								
Base metals	$ 42,000,000	$ --	$ --	$ --	$ --	$ --	$ --	$ 42,000,000
Polymetallic	--	--	--	--	--	16,300,000	--	16,300,000
Precious metals								0
Placer[a]	2,500	75,000	125,800	16,000	10,000	--	--	229,300
Lode	--	18,841,000	112,637,000	--	1,356,000	92,730,000	--	225,564,000
Coal and peat	--	--	W	W	--	--	--	
Industrial minerals	--	--	--		--	--	--	9,000,000
Other	--	--	--	200,000	--	--	--	200,000
TOTAL	**$ 42,002,500**	**$18,916,000**	**$112,762,800**	**$ 216,000**	**$1,366,000**	**$109,030,000**	**$ --**	**$ 293,293,300**
Development Employment								
Employment								
Workdays	14,110	4,533	58,532	4,096	690	57,671	--	139,632
Workyears[b]	54	17	225	16	3	222	--	537
Number of companies reporting[c]	5	4	21	11	2	4	--	47

[a]Some companies reported development work but did not report an amount for the expenditure; these companies are listed as reporting, but the amounts spent are unknown and are not included in the development expenditures total.
-- = No expenditures reported.
W = withheld. Data included in state total.
[b]Some companies are active in more than one area/commodity.
[c]Based on 260-day work year. Total based on non-rounded numbers. Full-time equivalent employees per year.

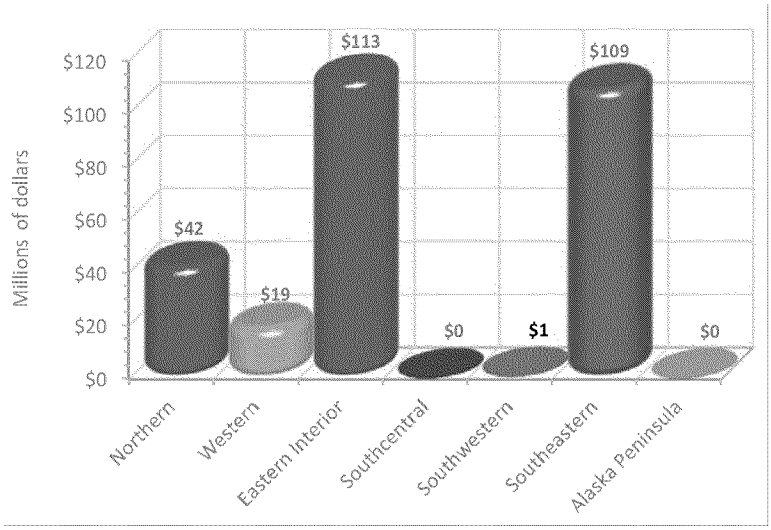


Figure 14. Development expenditures in Alaska by region, 2010.

Table 12. Reported mineral development expenditures in Alaska by commodity, 1982–2010.

Year	Base metals	Polymetallics	Precious metals	Gemstones[a]	Industrial minerals	Coal and peat	Total
1982	$ 10,270,000	N/A	$ 19,320,000		$ 4,251,000	$ 7,750,000	$ 41,591,000
1983	19,500,000	N/A	7,112,500		1,000,000	250,000	27,862,500
1984	10,710,500	N/A	15,058,555		579,000	27,000,000	53,348,055
1985	13,000,000	N/A	16,890,755		1,830,000	2,400,000	34,120,755
1986	3,260,800	8,000,000	12,417,172		124,000	530,000	24,331,972
1987	38,080,000	48,000,000	13,640,848		188,000	342,000	100,250,848
1988	165,500,000	69,000,000	40,445,400		--	--	274,945,400
1989	118,200,000	411,000	6,465,350		7,000,000	2,196,000	134,272,350
1990	--	4,101,000	7,136,500		30,000	3,079,000	14,346,500
1991	--	8,000,000	14,994,350		262,000	2,318,000	25,574,350
1992	80,000	4,300,000	23,151,300		404,000	1,655,000	29,590,300
1993	--	10,731,136	15,103,000		433,500	1,400,000	27,667,636
1994	10,000,000	5,000,000	27,392,850		5,000	2,545,000	44,942,850
1995	11,200,000	9,590,000	127,165,750		426,000	200,000	148,581,750
1996	60,000,000	60,100,000	273,042,000		495,000	400,000	394,037,000
1997	133,880,000	7,300,000	26,299,000		500,000	410,000	168,389,000
1998	28,000,000	5,600,000	15,602,000		5,355,000	850,000	55,407,000
1999	12,500,000	2,500,000	15,864,000		400,000	2,575,000	33,839,000
2000	100,000,000	16,400,000	24,699,000		611,000	--	141,710,000
2001	43,800,000	3,300,000	32,719,000		300,000	1,040,000	81,159,000
2002	--	5,700,000	26,655,000		250,000	1,450,000	34,055,000
2003	--	--	38,839,332		315,000	--	39,154,332
2004	17,700,000	6,215,000	177,440,081		4,991,434	2,760,000	209,106,515
2005	28,000,000	16,700,000	301,011,469		856,500	1,350,000	347,917,969
2006	31,200,000	26,183,280	420,759,203		1,566,000	15,985,000	495,693,483
2007	41,374,880	30,766,902	239,931,040		1,320,500	5,385,000	318,778,322
2008	45,000,000	24,000,000	319,702,594		205,113	7,260,000	396,167,707
2009[a]	29,000,000	17,500,000	277,020,142	225,250	270,000	6,800,000	330,815,392
2010	42,000,000	16,300,000	225,793,300	200,000	--	9,000,000	293,293,300
TOTAL	**$ 1,012,256,180**	**$ 405,698,318**	**$ 2,761,671,491**	**$ 425,250**	**$ 33,968,047**	**$ 106,930,000**	**$ 4,320,949,286**

N/A = Figures not available prior to 1986
-- Not reported
[a]Gemstone development category added in 2009.

I Northern Region

1. Red Dog Mine—Teck Resources Ltd.—Permitting, tailings improvement, sustaining capital projects

II Western Region

2. Rock Creek Mine—NovaGold Resources Inc.—Water management, care and maintenance
3. Nome placers
4. Nixon Fork project—Fire River Gold Corp.—Project evaluation, gold grade confirmation, metallurgical assessment

III Eastern Interior Region

5. Fort Knox Mine—Fairbanks Gold Mining Inc. (Kinross Gold Corp.)—Phase 2 heap leach construction, maintenance shop construction, tailings dam excavation and reconstruction, True North Mine reclamation
6. Placer gold
7. Pogo Mine—Sumitomo Metal Mining Pogo LLC—Underground development, road construction, diversion ditch repair, purchase and installation of generator
8. Usibelli Coal Mine—Usibelli Coal Mine Inc.
9. Placer gold

IV Southcentral Region

10. Chuitna Coal project—PacRim Coal LP—Studies, permitting
11. Gemstone development—Road and bridge construction
12. Industrial minerals—Various

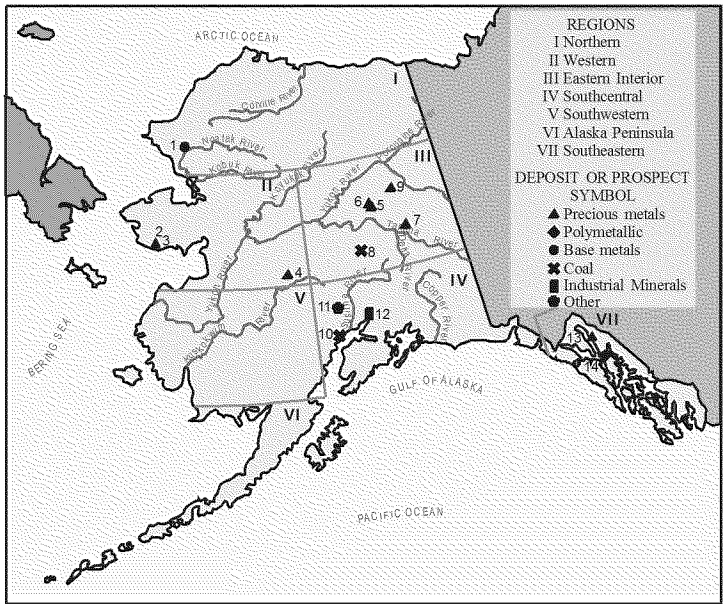


Figure 15. Selected development projects, 2010.

V Southwestern Region

VI Alaska Peninsula Region

VII Southeastern Region

13. Kensington Mine—Coeur Alaska Inc.—Development drilling, permitting, tailings facilities construction, sewer treatment plant expansion, assay laboratory construction
14. Greens Creek Mine—Hecla Greens Creek Mining Co.—Underground development drilling, surface and underground equipment and infrastructure rehabilitation and replacement

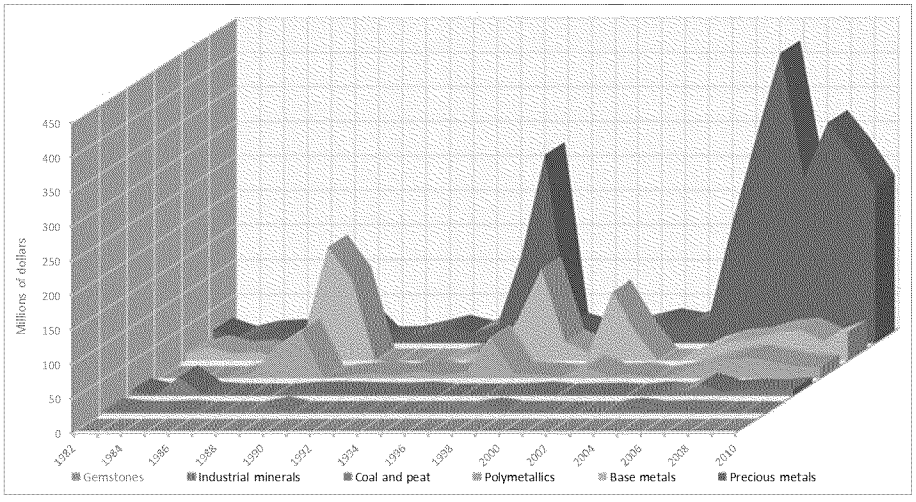


Figure 16. Mineral development expenditures in Alaska, by commodity, 1982–2010.

Red Dog Mine

Major capital projects at Red Dog Mine in 2010 included $20 million for tailings dams and $22 million on other sustaining capital projects.

WESTERN REGION

Development expenditures were reported for lode and placer projects in the western region. Four projects reported expenditures amounting to approximately $18.9 million for 2010, which compares to development expenditures of $24.5 million in 2009, a decrease of 23 percent. Total 2010 employment associated with these expenditures was 17 full-time-equivalent employees.

Rock Creek Mine

NovaGold Resources Inc.'s Rock Creek Mine is currently on care and maintenance status. Alaska Gold Company, a wholly owned subsidiary of NovaGold Resources Inc., states in its *Final Temporary Closure Plan* for Rock Creek that it anticipates staffing at approximately 14 employees during the temporary closure[7]. Approximately $18.8 million was spent for care and maintenance at Rock Creek in 2010. NovaGold reported that efforts were made in 2009 and 2010 to improve the project's water management structures. Table 13 lists the current gold reserves and resources reported for Rock Creek, Big Hurrah, and other NovaGold holdings at Nome.

Nixon Fork Mine

The Nixon Fork gold and copper mine near McGrath is owned by Fire River Gold Corp. Facilities at Nixon Fork Mine include a 200-ton-per-day flotation plant with a gravity gold separation circuit, a sulfide flotation circuit, and a newly constructed carbon-in-leach (CIL) gold-leaching circuit. The mine also includes a fleet of mining vehicles, a power plant, maintenance facilities, an 85-person camp, office facilities, and five aircraft landing strips. Mining and processing operations at Nixon Fork are fully permitted and bonded. Mine stockpiles add up to 2,315 tons of ore, and approximately 127,868 tons of mineralized tailings.

In 2009 and 2010, Fire River Gold Corp. evaluated the project to confirm the status of the geological work, confirm the gold grade from the tailings ponds, and perform further metallurgical assessment through test work. Gold production is expected in the summer of 2011, and a Preliminary Economic Assessment for underground mining, a complete gold recovery plant (carbon-in-leach [CIL] circuit), and a 92,000 foot drill program are planned to be completed in 2011.

Table 13. Gold reserves and resources at Rock Creek, Big Hurrah, and various NovaGold holdings at Nome, as of December 22, 2009 and as of June 1, 2010.

		RESERVES		
Project	**Category**	**Tons**	**Bank Cubic Yards**	**Ounces**
Rock Creek	Probable	8,600,000	--	320,000
Big Hurrah	Probable	1,320,000	--	190,000
TOTAL		**9,920,000**	--	**510,000**
		RESOURCES		
Project	**Category**	**Tons**	**Bank Cubic Yards**	**Ounces**
Rock Creek	Indicated		--	290,000
	Inferred	660,000	--	20,000
Big Hurrah	Indicated	992,000	--	80,000
	Inferred	220,000	--	20,000
Saddle	Historical	3,970,000	--	258,000
Nome Gold	Measured		103,500,000	800,000
Indicated			109,600,000	760,000
Inferred			40,000,000	250,000
TOTAL		**5,842,000**	**253,100,000**	**2,478,000**

-- Not applicable.

[7]Alaska Gold Company, Final Temporary Closure Plan [for Rock Creek Mine], February 20, 2009, page 3.

EASTERN INTERIOR REGION

Total construction and other capitalized expenditures credited to the eastern interior region in 2010 amounted to $112.8 million (exclusive of coal expenditures), compared with $203.2 million (exclusive of coal expenditures) in 2009, a decrease of 44 percent. Coal expenditures shown as withheld are reflected in the total statewide expenditures.

The eastern interior region showed the highest regional development spending in 2010, with 21 projects reporting development activity. Estimated employment allocated to development in the region in 2010 amounted to 225 full-time-equivalent positions.

Fort Knox Mine

Fort Knox Mine near Fairbanks is owned and operated by Fairbanks Gold Mining Inc., a wholly owned subsidiary of Kinross Gold Corp. Fort Knox Mine includes the main Fort Knox open-pit gold mine, the mill and tailings storage facility, and the Walter Creek Valley Fill Heap Leach Facility. The True North open-pit mine is currently being reclaimed.

In 2010, development activities included completion of construction of Stage 2 of the Walter Creek Valley Fill Heap Leach Facility; initiation of construction of Stage 3 of the heap leach and completion of a new access road; completion of construction on the Assembly Line Preventative Maintenance (ALPM) shop to support maintenance of the haul trucks; excavation of the tailings dam to an elevation of 1,466 feet above sea level, and reconstruction with the angle of the engineered core reversed back to the elevation of 1,488 feet above sea level. Improvements in the mill in 2010 included gravity circuit upgrades, semi-autogenous grinding (SAG) mill drive upgrade, tailings pumping system, and No. 8 belt bypass conveyor. Completion of reclamation at True North in 2010 included 148.6 acres graded, 52 acres covered with growth media, and 269.5 acres scarified, seeded, and fertilized.

Capital expenditures at Fort Knox Mine were approximately $87.6 million in 2010, compared with $133.1 million in 2009.

Pogo Mine

Sumitomo Metal Mining Pogo LLC (SMM Pogo) operates the Pogo Mine on behalf of owners Sumitomo Metal Mining Co. Ltd. (85 percent) and Sumitomo Corp. (15 percent). Development activity remained high at the underground Pogo Mine north of Delta Junction in 2010, with ramp development planned to continue in 2011.

Development activities at Pogo in 2010 included completion of 17,501 feet of lateral development; regrading of the entire all-season road several times; capping of the all-season road with D-1 road gravel (from Material Site 18) between Mile 0 and Mile 28; construction of 9,000 feet of dirt berms and concrete barriers on the roadsides to increase safety; demolition of the old Lower Camp (exploration camp) in September 2010 and construction of a new core shack (60 feet by 40 feet) on the vacant lot in December 2010; widening of the 1,525 portal access road by 20 feet for the interval of 700 feet; repair of the diversion ditch with approximately 1,000 feet of shotcrete lining to decrease possible seepage; and the purchase and installation of a new 2,000-kilowatt generator for backup power.

SOUTHCENTRAL REGION

Development expenditures totaling $216,000 (exclusive of coal expenditures) were reported for 11 projects in 2010. This is 59 percent less than the $532,750 (exclusive of coal expenditures) spent in 2009. Coal expenditures shown as withheld are reflected in the total statewide expenditures. Estimated development employment in the southcentral region was 16 full-time-equivalent positions in 2010, compared with 19 in 2009.

Diamond Gold Corp. reported development activity including 5 miles of pioneer road construction for its Sable–Kahiltna Mine in the Yentna mining district. No industrial minerals (rock, sand, and gravel) projects reported development activity in 2010.

Chuitna Coal Project

PacRim Coal LP continued environmental, permitting, and engineering work on the Chuitna Coal project west of Anchorage on the north side of Cook Inlet. The project is being designed to include a coal export terminal at Ladd Landing, connected to the mine with a 12-mile-long covered conveyor. Conceptual mine production capacity is designed to handle between 3 million and 12 million tons per year. Proven reserves are reported to be 771 million tons.

SOUTHWESTERN REGION

Development expenditures totaling $1.37 million were reported by one placer and one lode gold project in 2010. This compares with zero reports of development activity in the region in 2009.

ALASKA PENINSULA REGION

No development activity was reported in this region in 2010.

SOUTHEASTERN REGION

In the southeastern region, one lode gold, one polymetallic,and two placer operations reported development expenditures in 2010, the same number and type of projects that reported development expenditures in the region the previous year. Construction was completed

at the Kensington project, and Greens Creek Mine saw ongoing development throughout the year. Development expenditures in the southeastern region totaled $109.0 million. Development-related employment in the southeast region in 2010 was approximately 222 full-time-equivalent employees.

Greens Creek Mine

Greens Creek Mine, an underground silver, zinc, lead, and gold mine on Admiralty Island near Juneau, is owned by Hecla Greens Creek Mining Co., a wholly owned subsidiary of Hecla Mining Co. Development work in 2010 included drilling and preliminary production work. Hecla reported 2010 capital expenditures of $16.3 million at Greens Creek, on projects focused on rehabilitation, replacement, and enhancement of surface and underground equipment and infrastructure. Those projects are expected to continue into 2011, as well as the project to expand the dry stack tailings facility, and further equipment additions.

Kensington Mine

Kensington Mine is owned and operated by Coeur Alaska Inc. (Coeur), a wholly owned subsidiary of Coeur d'Alene Mines Inc. The project is near Berners Bay and Lynn Canal, to the north of Juneau.

All major underground development activities and surface facilities at Kensington were complete by 2009, with the exception of the tailings facility.

Construction activities resumed in 2010, and included completion of the tailings treatment facility (TTF) in the third quarter, along with the tailings conveyance pipeline from the mill facility to the TTF. The mine started processing ore on June 24, and began commercial production on July 3, 2010. Additional infrastructure construction in 2010 included construction of an assay laboratory, tailings treatment facility water treatment plant, Comet Mine water treatment plant expansion, Pit 3 maintenance shop tent, sewer treatment plant expansion, and propane tank. The development drilling program for 2010 included 55,130 feet in 330 holes. Capital expenditures at Kensington for the year were $92.7 million.

PRODUCTION

The total value of mineral production in Alaska during 2010 is estimated at $3.13 billion, slightly below the 2007 record production value of $3.37 billion. The 2010 estimate represents an increase in value of approximately $669.8 million, or an increase of 27 percent from the 2009 production value of $2.46 billion. Figure 17 shows selected production projects for 2010. Note that the industrial minerals sector reflects reporting shortfalls. Several major rock, sand, and gravel producers declined to contribute their production numbers, which are consequently not included, and estimates are known to be lower than actual production totals. Metals (gold, silver, copper, lead, and zinc) account for $2,999 million (about 96 percent of the total); coal and peat for $73.31 million (2.3 percent of the total); industrial minerals for $50.90 million (1.6 percent of the total); and gemstones and semiprecious stones for $2.30 million (0.07 percent of the total). Table 14 shows the estimated mineral production and its associated value for 2008–2010.

Allocation of value of production for 2010 by commodity is shown in figure 18. Zinc leads with the largest percent of value at 41.99 percent, with Red Dog Mine the most significant contributor to total zinc production. Gold remained in second place, carrying 35.83 percent of total value. In descending order, the values of the remaining production are: lead, 9.09 percent; silver, 9.04 percent; coal and peat, 2.35 percent; and industrial minerals (rock, sand, gravel, and gemstones), 1.7 percent.

Table 15 shows the average annual metal values used in this report over the last 17 years; figure 19 shows the values graphically to facilitate trend visualization. Some respondents reported actual unit values received for production; in cases where actual values were available, they were used in place of the average values in the table. In general, however, metal values were computed from weekly averages on the London Metal Exchange, and do not take into account mining, shipping, smelting, and other costs incurred by the producer.

The increased mineral production value in 2010 compared with 2009 resulted primarily from an increased production volume of gold and increased value of gold, silver, lead, and zinc. Average prices of gold, silver, copper, lead, and zinc were higher in 2010 than in 2009. The price for gold increased 25.93 percent; silver increased 37.63 percent; copper increased 45.53 percent; lead increased 24.36 percent; and zinc increased 30.67 percent.

The production estimates included in this report are from questionnaires returned to DGGS by miners and mining companies, Native organizations, government agencies, municipalities, and service companies. The information returned on questionnaires is complemented by telephone queries, emails, faxes, and information gleaned from annual reports, 10-K reports, and news releases by producers. Additional information was derived from State of Alaska Annual Placer Mining

Applications (APMAs) submitted to the Division of Mining, Land & Water. Appendix B lists Alaskan metal producers for 2010.

The authors are grateful to the Alaska Railroad Corp., the Mental Health Trust Land Office, the Department of Transportation and Public Facilities, the Division of Mining, Land & Water, the Department of Environmental Conservation, the Fairbanks North Star Borough, the Denali Borough, the City and Borough of Juneau, Alyeska Pipeline Service Co., the U.S. Forest Service, the U.S. Bureau of Land Management, Native regional corporations, and the many large and small Alaska mining operations that contributed data to this report.

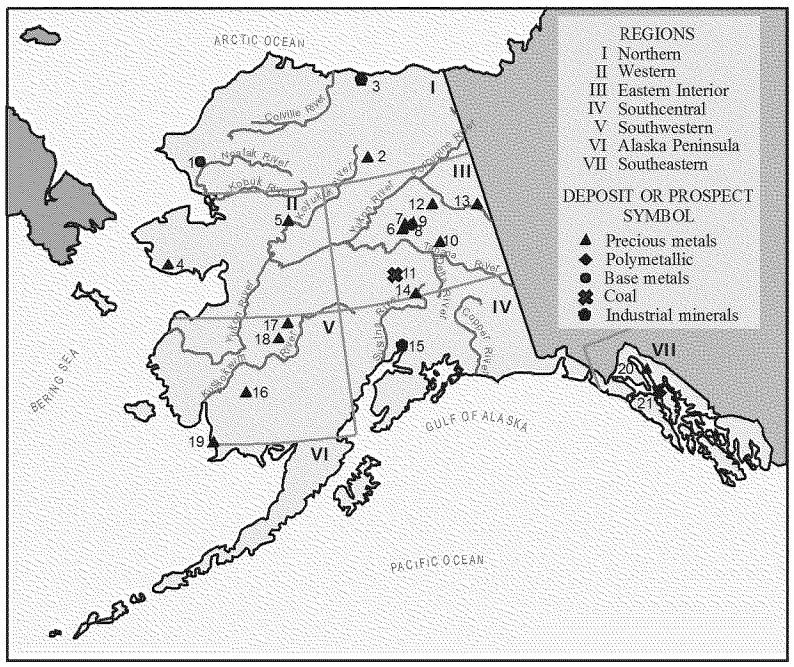
Tables 16 and 17 show gold production by region of the state, and placer production by small, medium, and large-sized producers. Two placer operations achieved a "large-sized" rating in 2010, each producing in excess of 2,500 ounces of gold. Total placer gold production in Alaska in 2010 was 69,318 ounces, compared with 60,250 ounces of placer gold produced in 2009. The Eastern Interior region was the biggest placer producer in 2010, producing an estimated 33,323 ounces, followed by the Western region at 21,107 ounces. The Southwestern region produced an estimated 8,197 ounces, and the Southcentral region 3,978 ounces in 2010. The Northern region reported 2,595 ounces of placer gold production; less than 1 ounce of placer gold production was reported in the Alaska Peninsula region. An estimated 227 placer mines operated in Alaska in 2010, compared with 234 in 2009, a decrease of 3 percent. Total employment in the placer industry in 2010 is estimated at 440 full-time-equivalent employees, including recreation-sized operations, compared with approximately 435 full-time equivalent positions in 2009, an increase of just over 1 percent. Figure 20 graphs the historic gold production in Alaska, from 1880 through 2010, and its corresponding value in the year it was produced.

I Northern Region
1. Red Dog Mine—Teck Alaska Inc.—zinc, lead, silver (germanium, indium, cadmium)
2. Placer gold mines—gold
3. Prudhoe Bay and Kuparuk pits (numerous)—sand and gravel

II Western Region
4. Nome—placer gold mines—gold, sand, and gravel
5. Placer gold mines—gold

III Eastern Interior Region
6. Placer gold mines—gold
7. Fairbanks district—Polar Mining Inc.—gold, silver, screened aggregate
8. Fort Knox Mine—Fairbanks Gold Mining Inc.—gold
9. Fairbanks—Earthmovers of Fairbanks Inc.—gold
10. Pogo Mine—Sumitomo Metal Mining Pogo LLC—gold
11. Usibelli Coal Mine—Usibelli Coal Mine Inc.—coal
12. Placer gold mines—gold
13. Placer gold mines—gold
14. Placer gold mines—gold

IV Southcentral Region
15. Palmer/Wasilla—sand and gravel



V Southwestern Region
16. Nyac Gold LLC—gold
17. Placer gold mines—gold
18. Placer gold mines—gold
19. Platinum—XS Platinum Inc.—platinum, gold

VI Alaska Peninsula Region

VII Southeastern Region
20. Kensington Mine—Coeur Alaska Co.—gold
21. Greens Creek Mine—Hecla Mining Co.—silver, zinc, gold, lead

Figure 17. Selected production projects, 2010.

Table 14. Estimated mineral production in Alaska, 2008–2010.[a]

Production	Production Quantities			Estimated Values[b]		
	2008	2009	2010	2008	2009	2010
Metals						
Gold (ounces)[c]	800,752	780,657	914,462	$ 698,223,883	$ 759,071,381	$ 1,119,785,870
Silver (ounces)	14,643,735	15,617,436	13,991,297	219,496,408	229,159,324	282,523,457
Copper (tons)[d]	--	--	--	--	--	--
Lead (tons)	153,705	167,204	146,480	287,428,350	260,838,240	284,171,225
Zinc (tons)	626,135	712,496	667,539	1,055,220,098	1,068,744,000	1,312,390,330
Subtotal				**$ 2,260,368,739**	**$2,317,812,945**	**$2,998,870,882**
Gemstones and semi-precious stones[e]						
Gemstones and semi-precious stones[e]					$ 300,000	$ 2,303,950
Subtotal					**$ 300,000**	**$ 2,303,950**
Industrial Minerals						
Sand and gravel (million tons)	12.5	4.7	7.0	$ 72,438,792	$ 41,366,244	$ 47,988,416
Rock (million tons)	2.5	1.8	0.3	39,324,787	27,234,160	4,312,785
Subtotal				**$ 111,763,579**	**$ 68,600,404**	**$ 52,301,201**
Coal and Peat						
Coal (tons)[f]	1,538,000	1,861,714	2,061,000	$ 53,830,000	$ 68,838,920	$ 73,307,757
Peat (cubic yards)[f]	83,789	240,510	78,184	1,159,502		
Subtotal				**$ 54,989,502**	**$ 68,838,920**	**$ 73,307,757**
TOTAL				**$ 2,427,121,820**	**$2,455,552,269**	**$3,126,783,790**

[a]Production data from DGGS questionnaire, phone interviews with mine and quarry operators, DOT&PF, and municipalities, regional corporations, and federal land management agencies.
[b]Values for selected metal production were based on average prices for each year (unless other values were provided by the operator); for 2010–gold $1,224.53/oz, silver $20.19/oz, lead $0.97/lb, zinc $0.98/lb.
[c]2010 lode production was 845,144 ounces; placer production was 69,318 ounces.
[d]No copper production in Alaska from 2008 to 2010.
[e]Gemstones and semi-precious stones category added in 2009.
[f]Coal and peat production values are combined in 2009 and 2010.

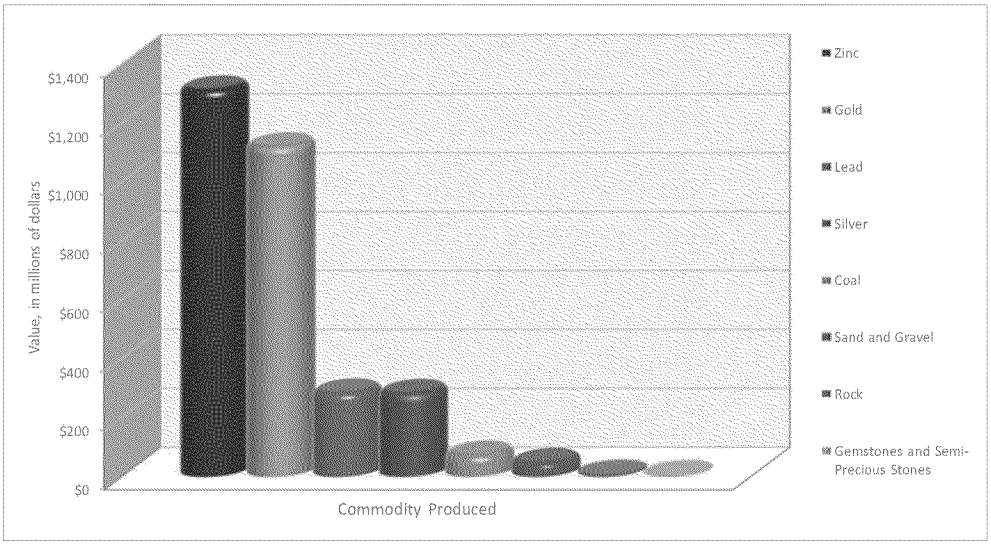


Figure 18. Estimated mineral production value by commodity.

Table 15. Average metal prices, 1994–2010.

	Gold $/oz	Silver $/oz	Copper $/lb	Lead $/lb	Zinc $/lb
1994	$386.00	$5.41	$1.05	$0.35	$0.45
1995	395.00	5.43	1.33	0.34	0.48
1996	387.60	5.19	1.03	0.37	0.49
1997	330.76	4.91	1.03	0.28	0.59
1998	293.88	5.53	0.75	0.24	0.46
1999	278.70	5.20	0.71	0.23	0.49
2000	279.10	4.96	0.82	0.21	0.51
2001	271.04	4.37	0.71	0.22	0.40
2002	310.06	4.61	0.41	0.21	0.35
2003	363.38	4.88	0.81	0.23	0.38
2004	409.72	6.67	1.29	0.40	0.47
2005	444.74	7.32	1.61	0.43	0.63
2006	603.46	11.55	3.02	0.58	1.47
2007	695.39	13.38	3.24	1.17	1.47
2008	871.96	14.99	3.12	0.94	0.84
2009[a]	972.35	14.67	2.35	0.78	0.75
2010[a]	1,224.53	20.19	3.42	0.97	0.98

[a]2009 and 2010 gold and silver prices come from Kitco; copper, lead, and zinc from British Columbia Ministry of Energy and Mines.

Tables 18 and 19 show the value and regional importance of sand and gravel and rock production. The rock sector suffered what appears to be a loss of production during the year, but this decline is more likely explained by reporting shortfalls. The value of the composite rock, sand, and gravel sector for 2010 is currently estimated to be $52.3 million, compared with a value of $68.6 million in 2009, a decrease in value of 24 percent. Figure 21 shows historical production of sand and gravel in Alaska since 1950. Employment in 2010 is estimated to be 324, compared with a final estimate of 369 in 2009, but reporting shortfalls in this sector are noted.

Sand and gravel production reported for 2010 amounted to 7 million tons produced by approximately 313 full-time-equivalent employees, compared with the 2009 sand and gravel production estimate of 4.7 million tons produced by 286 employees. Rock production reported for 2010 is 290,852 tons produced by 11 employees, compared with 2009 rock production of 1.8 million tons produced by 83 employees. Sizeable reporting shortfalls for both sand and gravel production and for rock production are noted. Several large rock, sand, and gravel producers declined to contribute non-mandatory information. As a result, rock, sand, and gravel estimates are incomplete and serve only as a minimum.

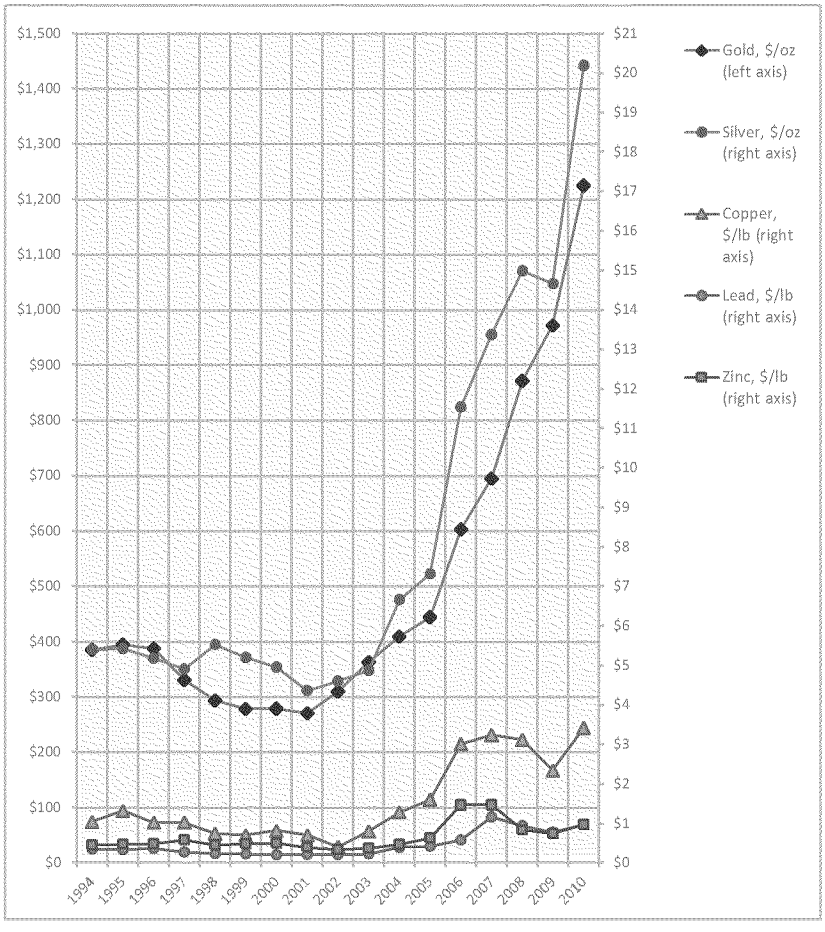


Figure 19. Average annual metal values, 1994–2010.

Table 16. Reported refined gold production, number of operators, and industry employment in Alaska, 2008–2010. [a,b]

Region	Number of operators			Production in ounces			Number of employees[b]		
2008		2009	2010	2008	2009	2010	2008	2009	2010
Northern	20	24	16	3,695	4,432	2,595	35	54	37
Western	37	49	47	14,704	27,741	21,107	66	96	107
Eastern Interior	103	109	120	704,334	671,323	766,486	877	968	1,021
Southcentral	25	32	28	2,424	4,979	3,978	47	80	48
Southwestern	11	18	14	8,197	4,659	8,197	18	47	38
Alaska Peninsula[c]	1	0	1	2	0	0	2	0	1
Southeastern[d]	3	6	5	67,396	67,523	112,100	322	343	541
TOTAL	**200**	**238**	**231**	**800,752**	**780,657**	**914,463**	**1,367**	**1,588**	**1,793**

[a]2010 production includes 845,144 ounces of gold from hardrock mines and 69,318 ounces of gold from placer sources.
[b]Includes recreational mining numbers (operators, ounces, employees) and is calculated on the basis of full-year employment.
[c]Production from this single source is combined with southwestern production for confidentiality purposes.
[d]Includes numbers in all categories from Greens Creek Mine, which is a polymetallic producer with a strong gold component.

Table 17. Production for selected Alaska placer gold mines, 2003–2010.

2003	2004	2005	2006	2007	2008	2009	2010
			Mine Size				
Small[a]	58	60	50	177	153	169	485	190
Medium[b]	4	5	20	21	19	24	16	35
Large[c]	2	3	1	3	2	2	2	2
TOTAL	**64**	**68**	**71**	**201**	**174**	**195**	**503**	**227**
			Production in Ounces[d]				
Small	8,124	7,621	6,783	23,343	19,755	19,601	23,916	17,358
Medium	4,976	4,504	17,822	22,144	23,366	27,298	20,680	23,160
Large	10,500	15,950	- -[e]	14,895	10,728	9,860	15,654	28,800
TOTAL	**23,600**	**28,075**	**24,605**	**60,382**	**53,849**	**56,759**	**60,250**	**69,318**

[a]<650 ounces of gold per year.
[b]650–2,500 ounces of gold per year.
[c]>2,500 ounces of gold per year.
[d]Does not include recreational production before 2006.
[e]2005 production combined with "Medium" producers.

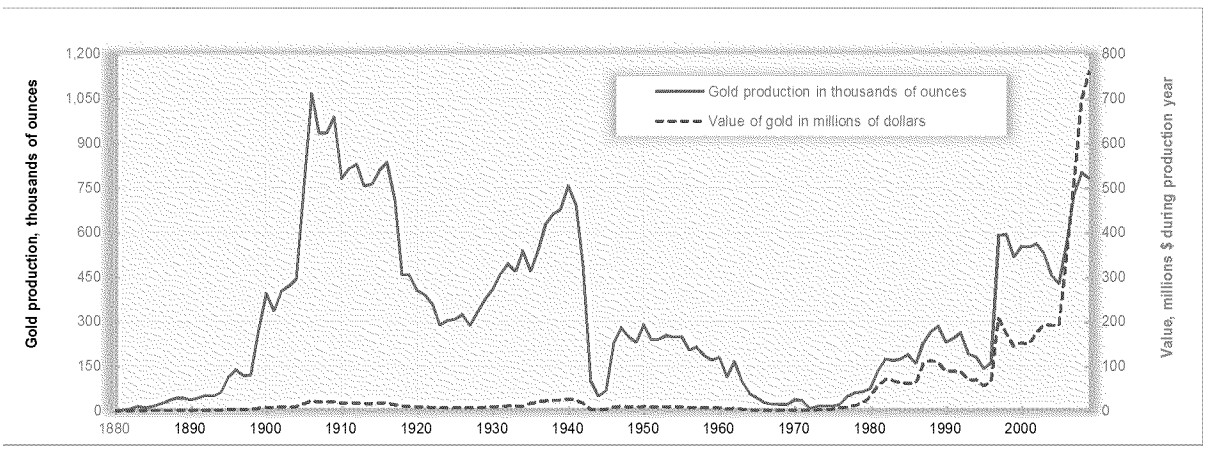


Figure 20. Historic gold production in Alaska, 1880–2010, and corresponding value.

Table 18. Reported sand and gravel production and industry employment in Alaska by region, 2010.

Region	Companies and reporting[a]	Tons	Estimated unit value ($/ton)[b]	Total Value	Estimated number of employees
Northern	30	2,431,018	6.7	$16,287,820	138
Western	9	169,315	6.7	1,134,410	10
Eastern Interior	37	1,742,161	6.4	11,232,560	93
Southcentral	36	1,966,003	7.9	15,583,666	58
Southwestern	2	444,925	4.9	2,200,000	2
Alaska Peninsula	0	- -	- -	- -	- -
Southeastern	7	223,875	6.9	1,549,960	12
TOTAL	**121**	**6,977,297**		**$47,988,416**	**313**

[a]From returned questionnaires, telephone surveys, follow-up fax questionnaires, and e-mails to probable producers, etc. Data were also returned from the Alaska Railroad, Alyeska Pipeline Service Co., DML&W, USFWS, USBLM, USFS, regional corporations, and others.
[b]Values are based on estimates from producers.
- - = Not reported.

Table 19. Reported rock production and industry employment in Alaska by region, 2010.[a]

Region	Companies and reporting	Tons	Estimated unit value ($/ton)[b]	Total value	Estimated number of employees
Northern	0	- -		$ - -	- -
Western	0			- -	- -
Eastern Interior	0	- -		- -	- -
Southcentral	0	- -		- -	- -
Southwestern	0	- -		- -	- -
Alaska Peninsula	0	- -		- -	- -
Southeastern	5	290,852	14.83	4,312,785	11
TOTAL	**5**	**290,852**	**14.83**	**$ 4,312,785**	**11**

[a]Includes shot rock, crushed stone, D-1, riprap, and modest quantities of ornamental stone.
[b]Values are based on estimates from producers, from historic records, etc.
- - = Not reported.

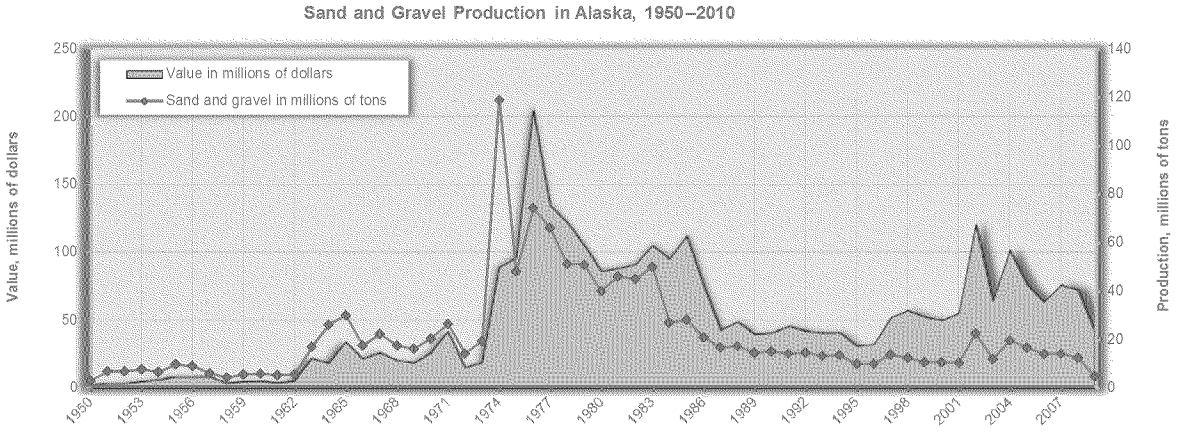


Figure 21. Sand and gravel production in Alaska 1950–2010.

The Alaska export value of minerals was $1.55 billion for 2010, 58 percent higher than in 2009 at $980 million. The total exports include copper–gold concentrates from the Minto Mine in Yukon that were shipped through the terminal in Skagway (table 20 and figure 22).

Peat production for 2010 is estimated at 78,184 cubic yards, produced by three employees, compared with 2009 production of 240,510 cubic yards produced by seven employees. There are assumed to be significant reporting shortfalls in this category.

NORTHERN REGION

The 2010 value of minerals production in the northern region is estimated to be $1.558 billion, with corresponding employment of 724 full-time-equivalent positions. Red Dog Mine dominated the production value and employment numbers. Placer gold and sand and gravel production were also noted in the region. In the Northern region, production was reported by 16 commercial placer mining operations, 30 sand and gravel operations, and one peat producer.

Approximately 37 full-time-equivalent positions were used in placer mining operations, and approximately 2,595 ounces of placer gold were produced. This compares with the 22 commercial and two recreational placer mining operations in the Northern region in 2009, which employed approximately 54 full-time-equivalent positions and produced an estimated 4,432 ounces of placer gold.

Red Dog Mine

Red Dog Mine is one of the world's largest zinc mines, both in terms of reserves (table 21) and annual zinc production (table 22 and fig. 23), producing lead and zinc concentrates that are trucked to a port on the coast for shipping during the summer. Red Dog dominates Alaska's mineral production value, accounting for

Table 20. Alaska international mineral exports.

Export value (millions of dollars)	
1996	$ 249
1997	$ 369
1998	$ 317
1999	$ 359
2000	$ 293
2001	$ 329
2002	$ 380
2003	$ 414
2004	$ 505
2005[a]	$ 603
2006[a]	$ 1,196
2007[a]	$ 1,317
2008[a,b]	$ 853
2009[c,d]	$ 980
2010[e,f]	$ 1,550

Source: U.S. Census Bureau, Origin of Movement Series.

[a]Includes mineral/metal ores and concentrates, coal, and unwrought, nonmonetary gold exports.

[b]Includes $103 million of copper concentrates produced in Yukon Territory by Sherwood Copper/Capstone Mining and shipped through the Skagway Ore Terminal.

[c]Includes zinc ores and concentrates, lead ores and concentrates, gold, nonmonetary, unwrought; coal; and zirconium ores and concentrates.

[d]Includes $64 million of copper concentrates produced in Yukon Territory by Sherwood Copper/Capstone Mining and shipped through the Skagway Ore Terminal.

[e]Includes zinc ores and concentrates, lead ores and concentrates, gold, nonmonetary, unwrought; coal; and zirconium ores and concentrates.

[f]Includes $37 million of copper concentrates produced in Yukon Territory by Sherwood Copper/Capstone Mining and shipped through the Skagway Ore Terminal.

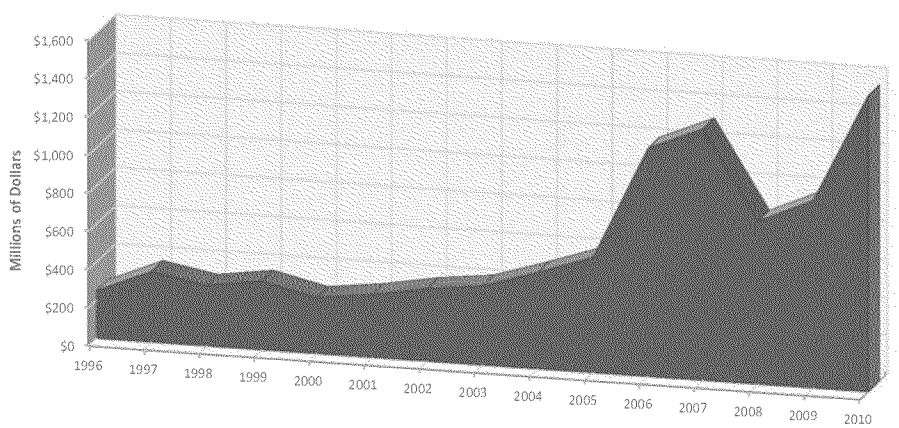


Figure 22. Alaska international mineral exports, 1996–2009.

Table 21. Reserves and resources by category at Red Dog Mine as of December 31, 2010 (Teck Resources Ltd., 2010 Annual Information Form).

Class	Metal	Category	Tonnes (millions)	Tonnes (millions)	Grade (percent)
Reserves	Zinc	Proven	1.70	1.87	20.7
		Probable	53.50	58.97	15.7
	Lead	Proven	1.70	1.87	5.0
		Probable	53.50	58.97	4.0
Resources	Zinc	Indicated	5.10	5.62	22.4
		Inferred	2.20	2.43	10.8
	Lead	Indicated	5.10	5.62	6.0
		Inferred	2.20	2.43	4.1

approximately 49 percent of the entire value of Alaska's mineral production in 2010 (photo 21). The mine is 100 percent owned and operated by Teck Resources Ltd. under an agreement with NANA Regional Corporation.

Red Dog Mine received all permits and in May 2010 began mining the Aqqaluk deposit adjacent to the main Red Dog deposit, extending the mine's life to 2031 (photo 22). According to Teck, the pit development proceeded successfully and ahead of schedule, and the first Aqqaluk ore was processed in the mill in August 2010.

During the 2010 shipping season, which ended October 22, 2010, the mine shipped 1,140,892 tons of zinc concentrate and 259,043 tons of lead concentrate, for an increase of about 1.5 percent for zinc and 6.6 percent for lead over 2009 totals. In 2009, Red Dog Mine reported shipments of 1,124,000 tons of zinc and 243,000 tons of lead concentrate.

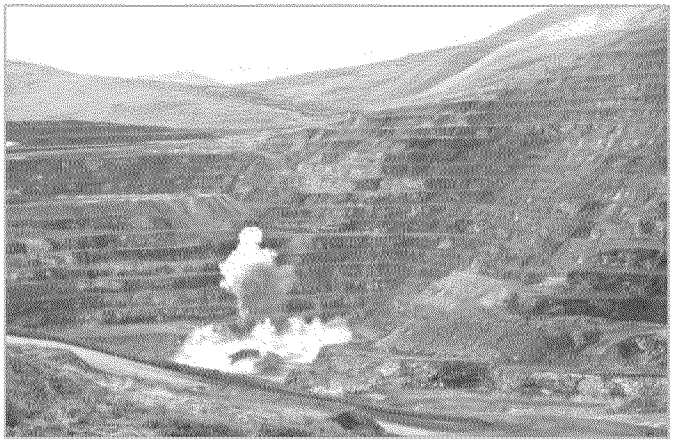


Photo 21. A production blast in the Main Pit at Red Dog Mine. Photo courtesy of Teck Resources Ltd.

Photo 22. The first development blast to provide rock materials for road building at the Aqqaluk deposit. Teck began mining the Aqqaluk deposit in 2010. Photo courtesy of Teck Resources Ltd.

Table 22. Red Dog Mine production statistics, 1989–2010.[a]

	Ore Tons	Grade			Total Tons Concentrate	Contained Tons	Contained Tons	Million Ounces	
	Milled	Zinc (%)	Lead (%)	Silver (oz/ton)	Produced[b]	Zinc	Lead	Silver[c]	Employees
1989	33,300	20.4	7.6	3.6	8,532	- -	- -	- -	228
1990	996,700	26.5	8.5	3.6	443,600	191,981	31,187	1.6	350
1991	1,599,300	22.5	6.6	2.8	521,400	234,510	43,815	1.46	331
1992	1,582,000	19.9	6	2.9	474,900	231,363	15,960	1.38	349
1993	1,874,600	18.4	5.7	2.8	539,800	255,149	24,788	1.51	376
1994	2,339,500	18.8	5.7	2.8	658,000	328,160	32,775	1.84	391
1995	2,485,900	19	5.8	2.8	753,600	358,676	55,715	3.62	397
1996	2,312,600	18.7	5	2.8	765,300	357,680	65,886	4.3	417
1997	2,127,000	20.3	5.2	2.9	799,400	373,097	69,284	4.27	479
1998	2,752,587	21.4	5.2	2.7	1,015,773	490,461	80,193	5.2	466
1999	3,282,788	21.3	5.2	2.7	1,207,160	574,111	97,756	6.21	539
2000	3,365,508	21	4.7	2.5	1,211,539	585,030	91,557	5.84	536
2001	3,560,430	19.8	5	2.5	1,215,837	570,980	105,000	5.9	559
2002	3,489,600	21.1	5.4	2.7	1,366,480	637,800	118,880	6.75	560
2003	3,476,689	21.7	6.2	3.1	1,410,892	638,569	137,679	7.7	388
2004	3,249,613	22	6	3	1,337,545	610,900	128,970	7.22	508
2005	3,402,831	21.7	5.6	3	1,330,717	626,112	112,766	1.97	449
2006	3,569,280	20.6	6.1	3	1,378,384	614,538	136,135	7.62	457
2007	3,726,910	20.2	6.1	3.1	1,428,014	633,511	146,152	11.55	459
2008	3,306,934	20.1	6	3.1	1,273,885	567,911	135,143	7.5	475
2009	3,729,119	20.9	5.9	3.1	1,445,870	642,096	144,954	8.12	413
2010	3,937,456	18.2	5.4	3.1	1,300,694	593,043	121,144	6.78	550

[a]Revised slightly from Special Report 51, Alaska's Mineral Industry 1995, based on new company data.
[b]Totals for years 1990 through 1995 include bulk concentrate.
[c]Estimate calculated at 56 ounces per ton of lead metal produced to from 1990 to 2004 and 2006, as reported credit for 2005, net of treatment charges, calculated at 3.1 oz/ton of ore for 2007.
- - = No concentrate produced.

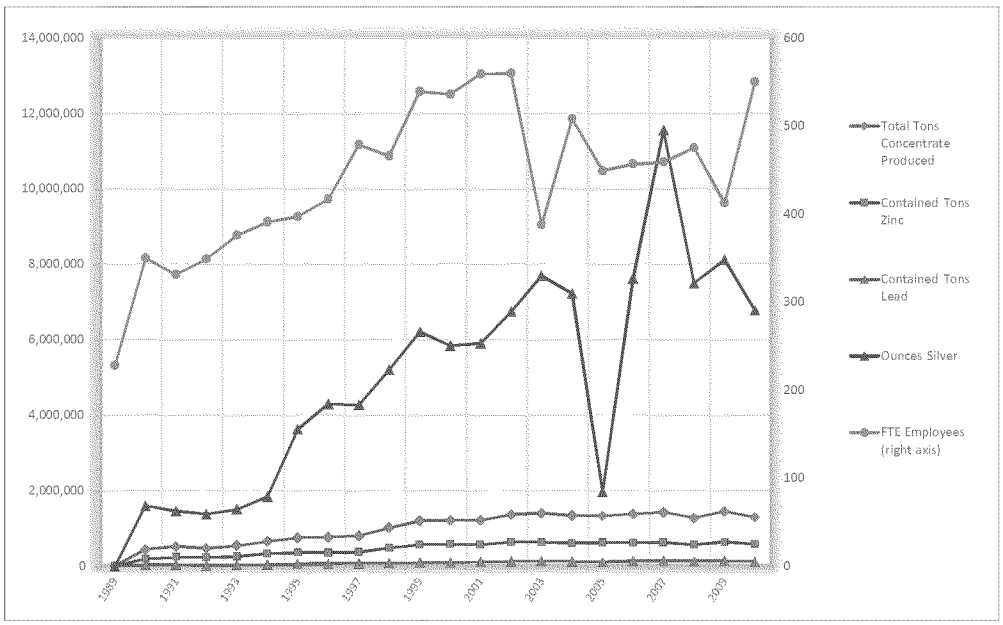


Figure 23. Red Dog Mine production statistics, 1989–2010.

Concentrate Produced[b]

Zinc and lead production were both lower in 2010 than in 2009 due to lower mill feed grades. However, record mill throughput and mine production were achieved in 2010. The project milled 3,937,456 tons of ore in 2010 with a zinc grade of 18.2 percent and a lead grade of 5.4 percent, compared with 3,729,000 tons milled in 2009 with a zinc grade of 20.9 percent and a lead grade of 5.9 percent. The mine produced 593,043 tons of zinc in concentrate and 121,144 tons of lead in concentrate in 2010. In addition, the mine was credited with production of 6,784,065 ounces of silver. In 2009, the mine produced 642,096 tons of zinc in concentrate, and 144,954 tons of lead in concentrate, and was credited with an estimated 8,114,400 ounces of silver.

Teck expects Red Dog's 2011 production to be approximately 612,000 tons of zinc in concentrate and 94,000 tons of lead in concentrate, higher in zinc and lower in lead than in 2010. Approximately two-thirds of the mill feed will be from the Aqqaluk deposit.

WESTERN REGION

Forty-seven placer operations, including nine recreational in nature, reported production in the region for 2010, compared with 49 placer and eight recreational operations for 2009. Reported production for 2010 was 21,107 ounces of gold, contrasted with a production of 27,741 ounces of gold in 2009. Placer gold employment in 2010 was estimated to be 107 full-time-equivalent positions, compared with 96 full-time-equivalent positions for 2009. Reporting shortfalls are noted with most of the commercial recreational services.

Sand and gravel production in the western region in 2010 was reported to be 169,315 tons from nine operations, compared with 464,387 tons from 15 operations in 2009. Employment was estimated to be ten full-time-equivalent jobs in 2010, compared with 22 full-time-equivalent jobs in 2009. Significant reporting shortfalls are also noted in this area.

No rock production was reported in this area in 2010, compared with 52,000 tons reported by one operation in 2009, with an estimated two full-time-equivalent jobs in 2009. Significant reporting shortfalls are assumed for this area.

EASTERN INTERIOR REGION

As in previous years, of the seven geographic regions used for this report, the eastern interior region again had the largest number of mining operations during 2010. Pogo Mine was the largest gold producer in the region, followed by Fort Knox Mine. Total gold production from the region was 766,486 ounces in 2010, compared with 671,323 ounces in 2009. Lode (hardrock) production of gold totaled 733,163 ounces, compared with 653,068 ounces in 2009.

Placer gold production from 118 operations amounted to 33,323 ounces, compared with 18,255 ounces from 107 operations in 2009. Eleven of the 2010 operations were considered recreational in size. The employment estimate for placer operations is 196 persons, compared with an estimated 136 persons who were employed in full-time-equivalent placer production in the region in 2009.

Sand and gravel production in 2010 totaled 1.74 million tons from 37 operations in 2010, compared with an estimated 1.55 million tons that were produced by 63 operations in 2009. Estimated employment for these operations was approximately 93 in 2010, compared with an estimated 56 full-time-equivalent positions in 2009. No rock production was noted, compared with 229,803 tons from 18 operations by 13 full-time-equivalent employees in 2009. The apparent decline is thought to be due to reporting shortfalls in the rock, sand, and gravel sectors.

No peat production was reported in the eastern interior region in 2010, compared with 33,265 bank cubic yards that were reported in 2009. The apparent decline in peat production is likely due to the lack of reporting in this sector. Employment for the coal and peat sectors was estimated to be 140 full-time-equivalent positions in 2010.

Fort Knox Mine

Fort Knox Mine produced 349,729 ounces of gold in 2010, a 33 percent increase from the 263,260 ounces produced in 2009 (table 23, fig. 24). Mining activity at Fort Knox produced 21.82 million tons of ore in 2010, compared with 27.59 million tons in 2009. Mill throughput in 2010 was 14,560,000 tons, compared with 2009 mill throughput of 17,884,000 tons, with an average 79.9 percent recovery in 2010, compared with 82.9 percent in 2009 (photo 23). Gold reserves at Fort Knox Mine were almost 5.8 million ounces at the end of 2010 (table 24).

According to Kinross, tons of ore mined decreased in 2010 compared with 2009 due to mining deeper in Phase 6, which caused longer haulage cycles due to mine sequencing, resulting in an increased reliance on stockpile sourcing. Tons of ore mined were also impacted by winter air inversions, which reduced the use of shovels and haul trucks during 2010. Tons of ore processed during 2010 increased by 59 percent over 2009, mostly from the ore placed on the heap leach pad, which only began operation during the third quarter of 2009, and to the processing of additional stockpiled ore. The gold grade was 14 percent higher in 2010 than in 2009 primarily from mine sequencing, as the mine plan called for mining an area of the pit with higher grade ore in 2010. Production during 2010 increased by 33 percent over 2009 following a full year of heap leach operation

during 2010 and the processing of higher grade ore, which more than offset marginally lower recovery levels.

In 2010, approximately 13.8 million tons of ore were placed on the heap leach. Projected heap leach ore placement for 2011 is 16.98 million tons. Projected mill throughput for 2011 is approximately 14.8 million tons, and gold production is estimated at 262,342 ounces.

Pogo Mine

Pogo Mine produced 383,434 ounces of gold in 2010, compared with 389,808 ounces in 2009, a 2 percent decrease (table 25). In 2010, a total of 900,585 tons of material was mined. The mill processed 947,189 tons for the year. Employment in September 2010 was 300 full-time-equivalent employees with an additional 100 contract employees in housekeeping and underground development.

Table 23. Fort Knox Mine production statistics, 1996–2010.

	Tons Mined (ore + waste)			Tons milled (ore)			Ounces Gold Produced	Employees
	Fort Knox	True North[a]	Total	Fort Knox	True North[a]	Total		
1996	16,684,000	NA	16,684,000	769,700	NA	769,700	16,085	243
1997	32,380,000	NA	32,380,000	12,163,151	NA	12,163,151	366,223	249
1998	33,294,000	NA	33,294,000	13,741,610	NA	13,741,610	365,320	245
1999	30,350,000	NA	30,350,000	13,819,010	NA	13,819,010	351,120	253
2000	35,600,000	NA	35,600,000	15,000,000	NA	15,000,000	362,929	253
2001	25,957,900	8,448,400	34,406,300	13,282,614	2,377,386	15,660,000	411,220	360
2002	24,583,500	11,461,000	36,044,500	11,887,200	3,371,800	15,259,000	410,519	360
2003	30,597,940	12,707,100	43,305,040	11,473,000	3,611,682	15,084,682	391,831	316
2004	44,187,000	3,763,000	47,950,000	12,917,966	1,675,854	14,593,820	338,334	427
2005	63,248,000	--	63,248,000	14,384,842	--	14,384,842	329,320	411
2006	51,070,000	--	51,070,000	14,839,297	--	14,839,297	333,383	406
2007	45,940,000	--	45,940,000	14,021,400	--	14,021,400	338,459	399
2008	46,300,000	--	46,300,000	15,110,000	--	15,110,000	329,105	449
2009	27,585,000	--	27,585,000	17,884,000	--	17,884,000	263,260	500
2010	42,400,000	--	42,400,000	14,560,000	--	14,560,000	349,729	525

[a]True North Mine started production in 2001 and suspended production in 2004.
-- = Not reported.
NA = Not available.

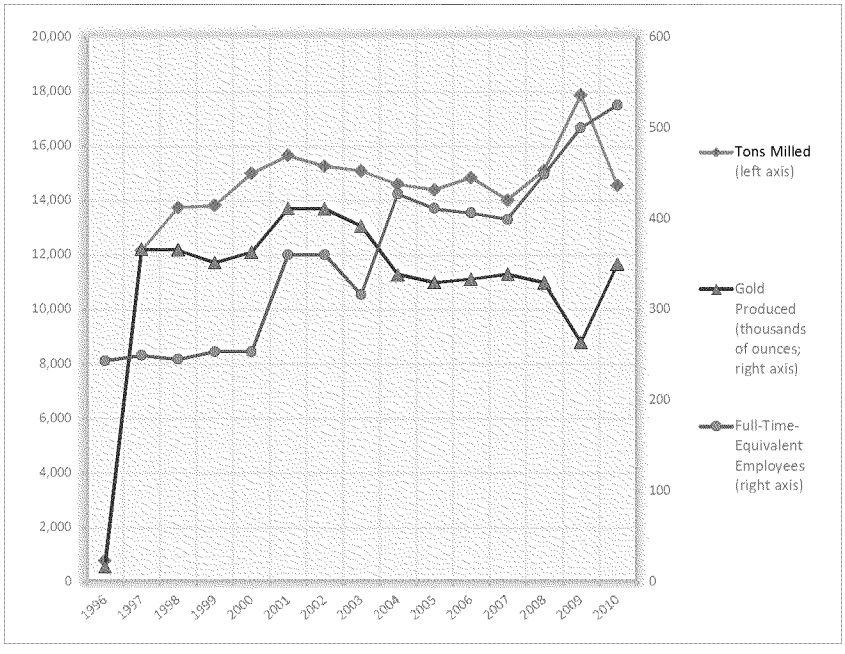


Figure 24. Fort Knox Mine production statistics, 1996–2010.

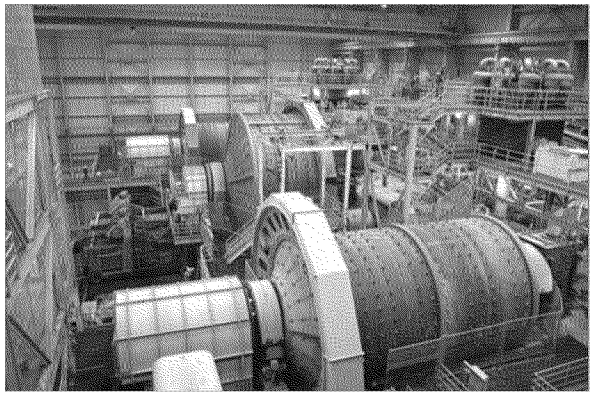


Photo 23. The Fort Knox Mine mill. Photo courtesy of Fairbanks Gold Mining Inc.

Table 24. Reserves at Fort Knox as of December 31, 2010.

	Tons	Grade	Gold (ounces)
Proven	279,363,000	0.0128	3,579,000
Probable	176,875,000	0.0125	2,214,000
Total	**456,238,000**		**5,793,000**

Usibelli Coal Mine

Usibelli Coal Mine Inc. continued production of subbituminous coal from its Two Bull Ridge site near Healy with an output of 2,061,000 tons of coal in 2010 (fig. 25), an 11 percent increase over the 1,861,714 tons of coal mined in 2009 (photo 24). About half of the coal produced at Usibelli was shipped to power plants in Interior Alaska; the remainder was exported.

SOUTHCENTRAL REGION

Sand and gravel production in the southcentral region was 2.0 million tons in 2010 reported by 36 producers, compared with 2.5 million tons reported by 43 producers in 2009. Full-time-equivalent employees were reported at 58 in 2010, compared with 66 in 2009. The apparent decline is thought to be due to a lack of responses from producers, and serious reporting shortfalls are noted in this sector.

No companies reported rock production in the south-central region in 2010, compared with reported rock production of 188,213 tons in 2009 by 12 operations with estimated employment of nine full-time-equivalent employees. The decline in production is thought to be due to the lack of response by producers, and serious reporting shortfalls are noted in this sector. The south-central region reported 12,869 bank cubic yards of peat production in 2010, compared with 37,900 bank cubic

Table 25. Pogo Mine production statistics, 2006–2010.

	Tons Ore Mined	Tons Ore Milled	Ounces of Gold Recovered	Head Grade Recovery (%)	Gold (oz/ton)	Employees[a]
2006	447,129	338,000	113,364	85	0.395	477
2007	715,665	715,400	259,820	84.4	0.43	339
2008	882,400	818,237	347,219	83.8	0.506	385
2009	944,823	930,836	389,808	88.2	0.475	400
2010	900,585	947,189	383,434	89.6	0.452	400

[a] Includes contractor employees; calculated as 11 hour days, 260 employee-days per year.

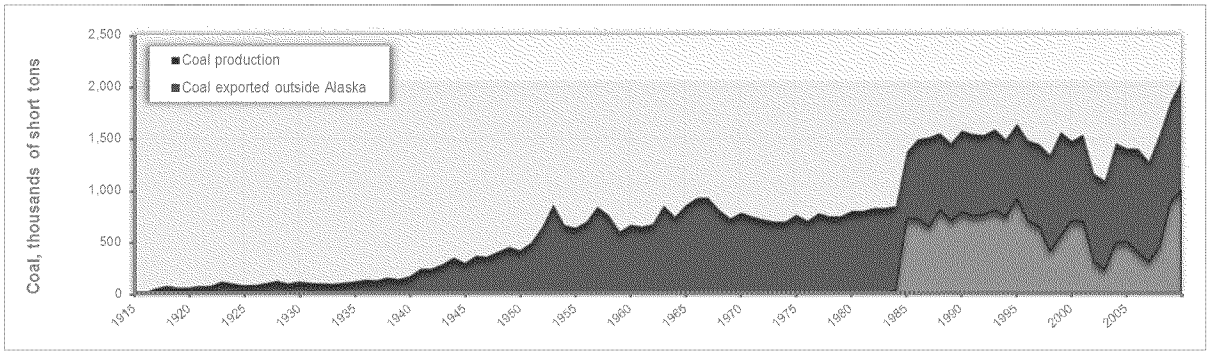


Figure 25. Coal production in Alaska, 1915–2010, including exports outside Alaska.

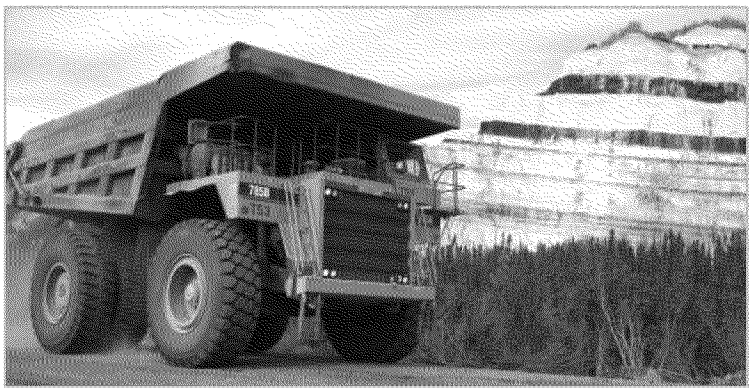


Photo 24. Haul truck at Usibelli Coal Mine passing exposed coal seams in Tertiary beds. Photo by Rod Combellick.

yards of production reported in 2009. Reporting shortfalls are noted in this sector.

Placer gold production in the southcentral region was estimated to be 3,978 ounces in 2010, compared with 4,979 ounces in 2009. Placer gold production was reported by 28 operators in 2010, compared with 32 in 2009. In 2010, four operations were recreational in size, compared with eight reported recreational-size operations in 2009. Total full-time-equivalent employment in 2010 was estimated at 48, compared with 80 positions in 2009.

Diamond Gold Corp. reported production of gemstones in 2010.

SOUTHWESTERN REGION

Placer gold production in the southwestern region amounted to 8,197 ounces in 2010, compared with 4,659 ounces in 2009 (photo 25). Estimated full-time-equivalent employment was 38 in 2010, compared with 47 in 2009. Fourteen operators reported production in the southwestern region in 2010, compared with 18 in 2009. In 2010, no recreational operations were reported in the southwestern region, compared with one recreational operation reporting in 2009.

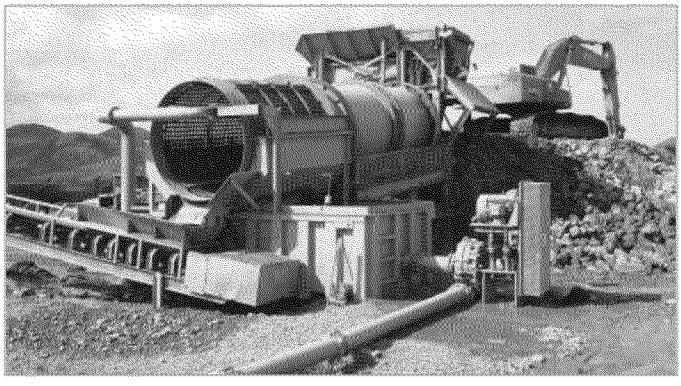
Sand and gravel production was reported in the southwestern region in both 2010 and 2009. Sand and gravel production in 2010 was reported at 444,925 tons and providing two full-time-equivalent jobs, compared with a reported production of 348,973 tons and 16 full-time-equivalent jobs reported in 2009. There was no rock production reported in this region in 2010, compared with a reported production of 376,160 tons and 21 full-time-equivalent jobs in 2009. Two sand and gravel and no rock producers provided reports in 2010, compared with four sand and gravel and 16 rock operations in 2009. Reporting shortages are noted in both sectors.

XS Platinum Inc. is reworking old mine tailings at Platinum Creek in the Goodnews Bay area (photo 26). According to shareholder information, "The 2010 mining season proved to be successful with the reconfiguration of the extraction plant to accommodate the first phase of up to date extraction equipment to significantly improve recoveries above those achieved in the 2009 mining season."[8]

ALASKA PENINSULA REGION

One recreational placer gold operator reported minimal production in the Alaska Peninsula Region in 2010, compared with no operations for any commodity reporting in 2009. The limited production reported from this area is believed to be due to reporting shortfalls rather than to a lack of production.

Photo 25. Placer gold mining on Shamrock Creek, Nyac mining district. Photo provided by Nyac Gold LLC.



[8]*Charter Pacific Corp. Ltd.*, "XS Platinum," ht pt//www.charpac.com.au/?page_id=539 , accessed Sept. 23, 2011.

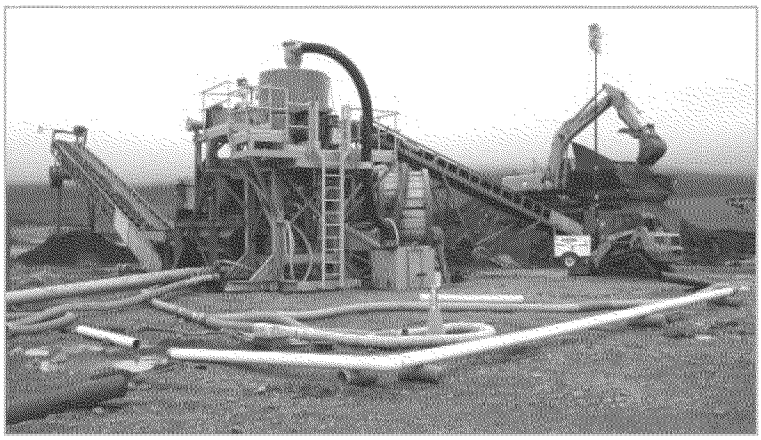


Photo 26. XS Platinum successfully reconfigured a placer extraction system to mine gold and platinum-group elements at Platinum and Squirrel creeks. Photo provided by XS Platinum Inc.

SOUTHEASTERN REGION

The southeastern region reported polymetallic, rock, sand and gravel, and placer gold production for 2010. Total employment in minerals industry production for the region was 564 full-time-equivalent positions in 2010, compared with approximately 382 full-time-equivalent positions in 2009.

Three placer gold operations reported production for 2010, with a yield of 119 ounces of gold. Estimated employment was 13 full-time-equivalent positions. This compares to five gold operations that reported production for 2009 and yielded 223 ounces of gold with 22 full-time-equivalent positions.

Rock, sand, and gravel operations in 2010 in the southeastern region produced 223,875 tons of sand and gravel and 290,852 tons of rock. Seven sand and gravel and five rock producers reported. This compared with rock, sand, and gravel operations in 2009 in the southeastern region that produced 172,260 tons of sand and gravel and 847,805 tons of rock, with 13 sand and gravel and 10 rock producers reporting. This area reported approximately 12 full-time-equivalent employees in the sand and gravel sector in 2010 and approximately 11 full-time-equivalent employees in the rock sector. This compares to 10 full-time-equivalent sand and gravel and 29 full-time-equivalent rock employees in 2009. The southeastern area is the only area with a lower sand and gravel to rock production ratio. Serious reporting shortfalls in the industrial minerals sectors are noted.

Greens Creek Mine

Greens Creek Mine is the fifth largest silver mine in the world. Hecla Mining Co. owns this polymetallic, volcanogenic massive sulfide deposit thru its wholly owned subsidiary, Hecla Greens Creek Mining Co. (photo 27). It produces a silver–gold doré and sulfide concentrates containing zinc and lead. The mine reports probable reserves of more than 8 million tons of ore containing silver, gold, lead, and zinc (table 26).

In spite of higher mill throughput, silver production at Greens Creek in 2010 was lower than in 2009 due to lower silver ore grades. Lead and zinc production increased due to higher mill throughput. In 2010, mill throughput at Greens Creek was 800,397 tons, compared with 790,871 tons processed in 2009. Greens Creek Mine produced 7.2 million ounces of silver in 2010 versus silver production of 7.5 million ounces in 2009.[9]

In 2010, the mine produced 68,838 ounces of gold, 74,496 tons of zinc, and 25,336 tons of lead (table 27). This compares with 2009 production of 67,278 ounces of gold, 70,379 tons of zinc, and 22,253 tons of lead.[9]

Photo 27. Haul trucks at Greens Creek Mine portal. Photo provided by Hecla Mining Co.

[9]Hecla Mining Company Form 10-K for the Fiscal Year Ended December 31, 2010, page 14, http://216.139.227.101/interactive/hl2010/hl2010ar.pdf?print_pages=true

Kensington Mine

Kensington Mine milled 174,028 tons of ore with an ore grade of 0.28 ounces of gold per ton and a recovery rate of 89.9 percent. The mine produced 43,143 ounces of gold during 2010, its first year of modern production, which began July 3. Metal sales were $23.6 million. Proven and probable reserves at Kensington as of December 31, 2010, were 5,937,000 tons with a grade of 0.24 ounces of gold per ton, containing 1,409,000 ounces of gold (table 28). Measured and indicated resources were 2,504,000 tons with a grade of 0.19 ounces of gold per ton, containing 478,000 ounces of gold.

Table 26. Reserves and resources by category at Greens Creek Mine as of December 31, 2010 (from Hecla Co. 2010 Annual Report).

Class	Tons	Grade Silver (oz/ton)	Gold (oz/ton)	Lead (%)	Zinc (%)
Probable Reserve	8,234,100	12.1	0.092	3.5	9.3
Mineralized Material	789,800	4.1	0.063	2.0	4.6
Other Resources	4,343,300	11.8	0.089	2.2	5.6
TOTAL	**13,367,200**				

Table 27. Greens Creek Mine production statistics, 1989–2010.

	Contained Metal							
	Tons Milled	Tons Concentrate	Tons Zinc	Tons Lead	Tons Copper[a]	Ounces Gold	Ounces Silver	Employees
1989	264,600	--	187,007	9,585	--	23,530	5,166,591	235
1990	382,574	--	37,000	16,728	--	38,103	7,636,501	265
1991	380,000	--	41,850	16,900	--	37,000	7,600,000	238
1992	365,000	113,827	40,500	16,500	--	32,400	7,100,000	217
1993[b]	77,780	--	9,500	3,515	--	7,350	1,721,878	217
1994[c]	--	--	--	--	--	--	--	--
1995[c]	--	--	--	--	--	--	--	--
1996[b]	135,000	43,000	9,100	4,200	193	7,480	2,476,000	265
1997	493,000	--	46,000	19,000	1,300	56,000	9,700,000	275
1998	540,000	--	58,900	22,700	1,300	60,572	9,500,000	275
1999	578,358	--	68,527	25,503	1,400	80,060	10,261,835	275
2000	619,438	--	84,082	31,677	1,400	128,709	12,424,093	275
2001	658,000	--	63,903	22,385	1,400	87,583	10,900,000	275
2002	733,507	217,200	80,306	27,582	1,600	102,694	10,913,183	262
2003	781,200	--	76,200	24,800	--	99,000	11,707,000	295
2004	805,789	--	69,115	21,826	--	86,000	9,707,000	265
2005	717,600	--	58,350	18,600	--	72,800	9,700,000	265[d]
2006	732,176	--	59,429	20,992	--	62,935	8,865,818	245[e]
2007	732,227	--	62,603	21,029	--	68,006	8,646,825	276[f]
2008	734,910	--	58,224	18,562	--	67,269	7,145,711	336[g]
2009	790,871	--	70,379	22,253	--	67,278	7,459,170	321[h]
2010	800,397	--	74,496	25,336	--	68,838	7,206,973	343[i]

[a]No copper credits in 1989–1993 and 2003–2010.
[b]Partial-year production.
[c]No production in 1994 and 1995 due to mine closure.
[d]Fifteen of these employees were assigned to development efforts.
[e]Fifty employees were assigned to development and reported in that section's employment.
[f]Forty-five employees were assigned to development and reported in that section's employment.
[g]Nineteen employees were assigned to development and reported in that section's employment.
[h]Eighty-five employees were assigned to development and reported in that sector's employment.
[i]Seventy-nine employees were assigned to development and reported in that sector's employment.
-- = Not reported.

Table 28. Reserves and resources by category at Kensington Mine as of December 31, 2010 (from Coeur d'Alene Mines Corp. 2010 Annual Report).

Class	Gold Tons	Gold (oz/ton)	Gold (troy ounces)
Proven Reserve	319,000	0.45	145,000
Probable Reserve	5,618,000	0.23	1,265,000
Proven and Probable Reserves	**5,937,000**	**0.24**	**1,409,000**
Measured Resource	193,000	0.19	36,000
Indicated Resource	2,311,000	0.19	442,000
Measured and Indicated Resource	**2,504,000**	**0.19**	**478,000**
Inferred Resource	551,000	0.22	121,000

Coeur Alaska plans a production rate of 125,000 ounces of gold per year. As of December 31, 2010, the mine had 178 full-time employees.

Kensington Mine is accessed through a horizontal tunnel and uses conventional and mechanized underground mining methods. The milling plant processes approximately 1,100 tons of ore per day, involving primary crushing, semi-autogenous grinding (SAG), mill grinding, gravity, and flotation concentration. About 40 percent of the tailings are returned to the mine for backfill. The remaining tailings are sent to the selected tailings disposal facility as required by the court resolution (photo 28). Concentrates will be packaged and shipped off site for final gold recovery. China National Gold Corp. signed an agreement with Coeur in 2010 to purchase half of the gold concentrates produced at Kensington.

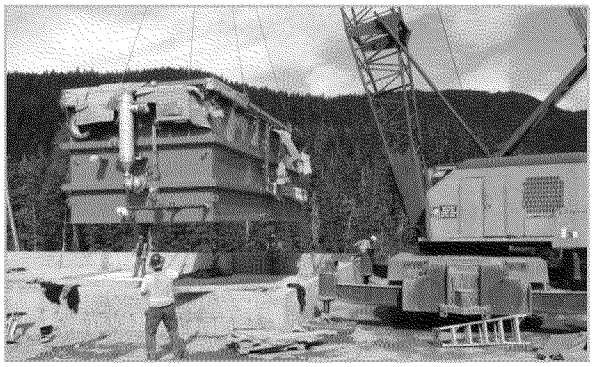


Photo 28. Completing the tailings treatment plant at Kensington Mine. Photo courtesy of Coeur Alaska Inc.

RECREATIONAL MINING

Recreational mining continues to attract attention as the price of gold appreciates. Production allocated to recreational mining was 164 ounces for 2010, compared with 367 ounces for 2009. Employment allocated to this sector was 35 full-time-equivalent employees in 2010, compared with 36 in 2009. This data is likely incomplete due to reporting shortfalls.

DRILLING

Various types of drilling are a necessary and important aspect of most mining projects. Drilling was conducted during all phases of mining (exploration, development, and production) on various projects across Alaska during the year. Table 29lists companies with a significant drilling program in Alaska during 2010, and table 30, figure 26, and table 31 summarize drilling activity in the state during 2010 by region and type of drilling.

Drilling totals for 2010 are 688,911 feet of core drilling, 216,768 feet of reverse-circulation drilling, 11,601 feet of drilling for coal, and 10,427 feet of placer churn/auger drilling. Placer churn/auger drilling may be underreported, but yearly total footage for placer operations has varied widely over the past decade. Development drilling, especially at Alaska's large lode mines, is also likely under-reported (photo 29). Blast-hole drilling during production at Alaska's large lode mines is not tracked, but likely exceeds several million feet, easily exceeding the footage drilled in all other aspects of mining.

About 42 percent of the 2010 drilling footage was from exploration and development projects in the eastern interior region of Alaska and about 28 percent of

Table 29. Companies reporting significant drilling programs in Alaska, 2010.

Coeur Inc. (Coeur Alaska Inc.)
Constantine Metal Resources Ltd.
Copper Ridge Explorations Inc.
Corvus Gold Inc./Ocean Park Ventures Corp.
Donlin Creek JV (Barrick Gold Corp. and NovaGold Resources Inc.)
Fire River Gold Corp.
First Star Resources Inc.
Freegold Ventures Ltd.
Full Metal Minerals Ltd.
Full Metal Minerals Ltd./Antofagasta Minerals PLC
Grande Portage Resources Ltd./Quaterra Resources Inc.
Heatherdale Resources Ltd./Niblack Mineral Development Inc.
Hecla Mining Co.
International Tower Hill Mines Ltd. (Talon Gold)
Kinross Gold Corp. (Fairbanks Gold Mining Inc.)
Kiska Metals Corp.
Millrock Resources Inc.
New Gold Inc.
Newmont Exploration Ltd.
Nyac Mining Co.
Pebble Limited Partnership (Northern Dynasty Minerals Ltd. and Anglo American PLC)
Pure Nickel Inc./Itochu Corp.
Stone Horn Ridge LLC (Cook Inlet Region Inc. [CIRI] and Laurus Energy Inc.)
Sumitomo Metal Mining LLC/Stone Boy Inc./Pathfinder Mineral Services
Sumitomo Metal Mining Pogo LLC
Teck Resources Ltd. (Teck Alaska Inc.)
Tintina Gold Resources Inc.
Trinity Metals Corp.
Triton Gold Ltd./Panoramic Resources Ltd./Tushtena Resources Inc.
Ucore Rare Metals Inc.
XS Platinum Ltd.

Table 30. Drilling footage by region in Alaska, 2010.[a]

Type of drilling	Northern	Western	Eastern Interior	South-central	South-western	South-eastern	Alaska Peninsula	Total
Placer subtotal	- -	- -	4,000	60	5,467	- -	900	10,427
Coal subtotal	- -	- -	- -	11,601	- -	- -	- -	11,601
Hardrock core	16,098	81,400	193,003	78,560	56,536	257,841	5,473	688,911
Hardrock rotary	- -	15,915	195,934	- -	4,919	- -	- -	216,768
Hardrock subtotal	16,098	97,315	388,937	78,560	61,455	257,841	5,473	905,679
TOTAL (feet)	**16,098**	**97,315**	**392,937**	**90,221**	**66,922**	**257,841**	**6,373**	**927,707**

- - = Not reported.
[a]Drill footages do not include sand and gravel drilling.

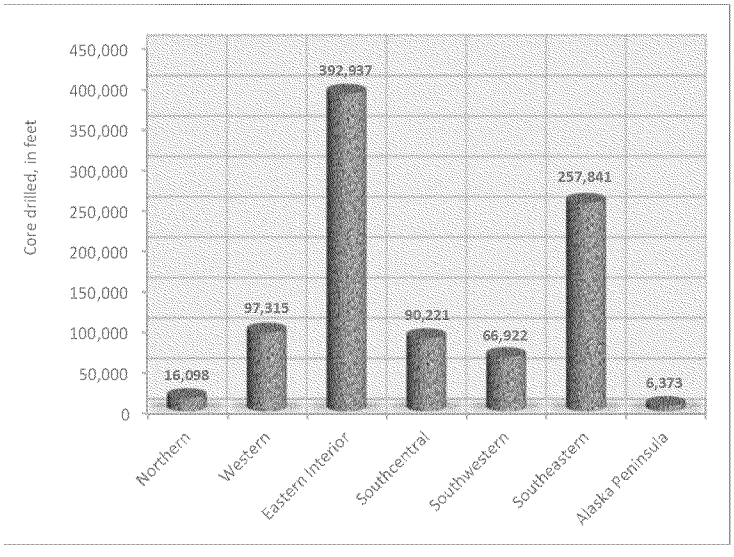


Figure 26. Drilling footage by region in Alaska, 2010.

Table 31. Drilling footage reported in Alaska, 1982–2010.

Year	Placer Exploration	Placer Thawing	TOTAL PLACER	TOTAL COAL	Hardrock Core[a]	Hardrock Rotary[a]	TOTAL HARDROCK FEET	TOTAL DRILLED
1982	30,000	94,000	124,000	80,000	--	--	200,000	404,000
1983	23,000	30,000	53,000	12,000	--	--	180,500	245,500
1984	31,000	98,000	129,000	25,700	--	--	176,000	330,700
1985	46,000	34,000	80,000	8,700	--	--	131,700	220,400
1986	32,400	227,000	259,400	28,800	--	--	50,200	338,400
1987	50,250	130,000	180,250	19,900	95,600	19,500	115,100	315,250
1988	152,000	300,000	452,000	26,150	223,630	130,230	353,860	832,010
1989	97,250	210,000	307,250	38,670	242,440	89,790	332,230	678,150
1990	78,930	105,000	183,930	18,195	648,600	112,355	760,955	963,080
1991	51,247	130,000	181,247	16,894	205,805	110,850	316,655	514,796
1992	6,740	65,000	71,740	12,875	211,812	148,022	359,834	444,449
1993	25,216	--	25,216	--	124,325	127,990	252,315	277,531
1994	21,000	--	21,000	8,168	347,018	91,692	438,710	467,878
1995	27,570	--	27,570	--	363,690	51,795	415,485	443,055
1996	61,780	--	61,780	8,500	524,330	134,527	658,857	729,137
1997	38,980	--	38,980	13,998	523,676	180,834	704,510	757,488
1998	33,250	--	33,250	2,300	505,408	45,670	551,078	586,628
1999	6,727	--	6,727	--	369,863	78,934	448,797	455,524
2000	15,480	--	15,480	--	418,630	127,638	546,268	561,748
2001	1,100	--	1,100	36,151	240,318	75,750	316,068	353,319
2002	1,250	--	1,250	--	385,290	103,612	488,902	490,152
2003	10,108	--	10,108	2,000	270,456	100,178	370,634	382,742
2004	107,526	--	107,526	--	415,628	36,024	451,652	559,178
2005	3,360	--	3,360	--	592,497	41,780	634,277	637,637
2006	8,759	--	8,759	7,500	765,363	54,173	819,536	835,795
2007	19,575	--	19,575	50,539	830,478	268,112	1,098,590	1,168,704
2008	1,216	--	1,216	26,869	874,634	250,278	1,124,912	1,152,997
2009	1,244	--	1,244	W	403,275	260,059	663,334	664,578
2010	10,427	--	10,427	11,601	688,911	216,768	905,679	927,707

[a]Core and rotary drilling not differentiated prior to 1987.
-- = Not reported.
W = withheld for confidentiality; included in hardrock rotary.

Photo 29. Blast hole drilling at the Aqqaluk deposit, Red Dog Mine. Photo provided by Teck Resources Ltd.

the drilling footage for the year was from exploration and development projects in southeastern Alaska. The eastern interior region had 90 percent of the hardrock rotary drilling in Alaska and 28 percent of the hardrock core drilling in Alaska. The southeastern region had the largest percentage of hardrock core drilling in Alaska during the year, with 37 percent of the total. The 2010 drilling footage increased almost 40 percent from the 2009 value, and was more than 36 percent higher than the average drilling total between 2000 and 2009. Figure 27 shows trends in drilling footage since 1982. Total drilling footage is expected to be close to one million feet in 2011 with improving economic conditions and continued high metal prices.

Information about significant drilling programs in Alaska during 2010 is summarized in the exploration and development sections of this report. The Livengood project, operated by International Tower Hill Mines Ltd., had the largest drill program in 2010 with more than 227,000 feet of reverse-circulation and core drilling (photo 30).

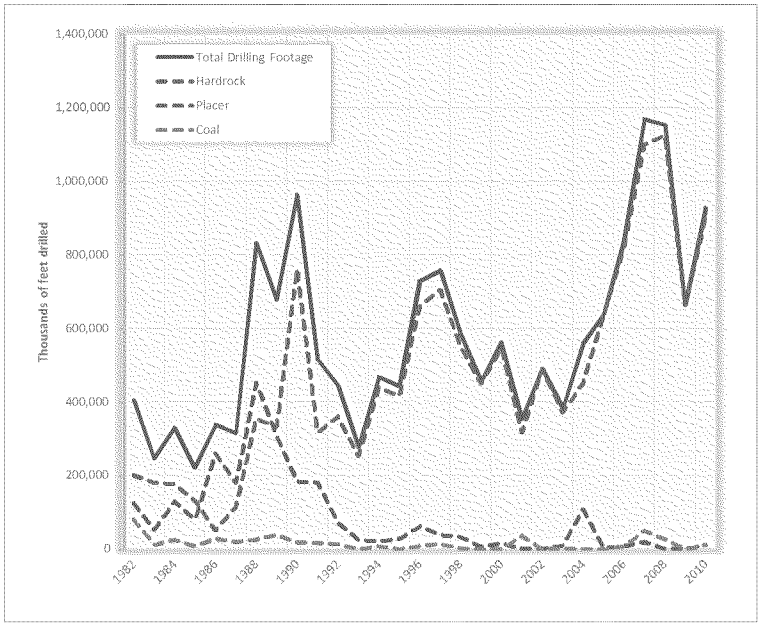


Figure 27. Drilling footage (in thousands of feet) reported in Alaska, 1982–2010.

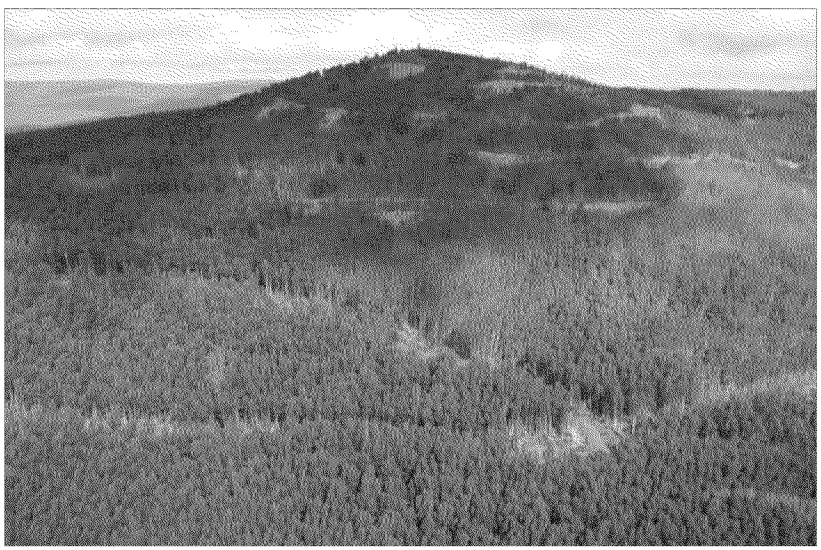


Photo 30. View of drill pads and drill access trails at Money Knob, Livengood mining district. The drill program on the Livengood project was the largest drill program in Alaska during 2010. Photo by David Szumigala.

APPENDIX A
U.S. Customary Units/Metric Units Conversion Chart

To convert from:	To:	Multiply by:
Weight/Mass/Ore Content		
ounces (avoirdupois)	grams	28.350
ounces (troy)	grams	31.1035
pounds	kilograms	0.4536
short tons	metric tons	0.9072
grams	ounces (avoirdupois)	0.03527
ounces	(troy)	0.03215
kilograms	pounds	2.2046
metric tons	short tons	1.1023
parts per million (ppm)	parts per billion (ppb)	1,000
parts per million (ppm)	ounces per ton	0.0292
parts per million (ppm)	grams/metric tons (tonnes)	1.00
Length		
miles	kilometers	1.6093
yards	meters	0.9144
feet	meters	0.3048
cen	t meters	30.48
millimeters		304.80
inches	cent meters	2.54
millimeters		25.4
kilometers	miles	0.6214
meters	yards	1.0936
feet		3.2808
millimeters	feet	0.00328
inches		0.03937
cent meters	inches	0.3937
Area		
square miles	square kilometers	2.590
acres	square meters	4,046.873
hectares		0.4047
square yards	square meters	0.8361
square feet	square meters	0.0929
square inches	square cent meters	6.4516
square	millimeters	645.16
square kilometers	square miles	0.3861
square meters	acres	
0.000247		
square	feet	10.764
square	yards	1.196
hectares	acres	2.471
square	meters	10,000.00
square cent meters	square inches	0.155
square millimeters	square inches	0.00155
Volume		
cubic yards	cubic meters	0.7646
cubic feet	cubic meters	0.02832
cubic inches	cubic cent meter	16.3871
cubic meters	cubic yards	1.3079
cubic	feet	35.3145
cubic cent meters	cubic inches	0.06102
gallons (U.S.)	liters	3.7854
liters	gallons (U.S.)	0.2642
milliliters	ounces (fluid)	0.03381
ounces (fluid)	milliliters	29.5735

SOURCE: *Minerals Today*, February 1993, U.S. Bureau of Mines.
Temperature conversions:
From degrees Fahrenheit to degrees Celsius, subtract 32 and multiply by 5/9.
From degrees Celsius to degrees Fahrenheit, multiply by 9/5 and add 32.

Appendix B
Companies and individuals reported to be producing metal in Alaska, 2010

OPERATOR	CREEK OR MINE	DISTRICT	TYPE[a]	E
	NORTHERN REGION			
Allen Post	Near Prospect Creek	Koyukuk–Nolan	O/P Placer	
Boreal Resources Inc./Eric Pyne	California Creek, Jim Pup	Koyukuk–Nolan	O/P Placer	
Compass Mining Inc./John Hall	Linda Creek	Koyukuk–Nolan	O/P Placer	
D.M.V.G. Ventures/Michael Fischer	Prospect Creek	Koyukuk–Nolan	O/P Placer	
Daniel Even and Matthew Even	Gold Creek	Koyukuk–Nolan	O/P Placer	
Fryar Gold Mining Group Venture	Prospect Creek	Koyukuk–Nolan	O/P Placer	
Doug Jones	Minnie Creek	Koyukuk–Nolan	O/P Placer	
Glen DeFord	Smally Creek	Koyukuk–Nolan	S/D – Recreation	
Goldrich Mining Company	Various	Chandalar	O/P Placer	
Green Resources LLC	Davis Creek	Koyukuk–Nolan	O/P Placer	
James and Lorna Lounsbury	Union Gulch	Koyukuk–Nolan	S/D – Recreation	
James Wicken	Gold Creek	Koyukuk–Nolan	O/P Placer	
Jim Olmstead and Richard Wright	Gold Creek	Koyukuk–Nolan	O/P Placer	
Larry Weisz	Hammond River	Koyukuk–Nolan	O/P Placer	
Lloyd Swenson	Slate Creek	Koyukuk–Nolan	O/P Placer	
Northern Lights Mining Inc./Ben Batty	Rye Creek, Jay Creek	Koyukuk–Nolan	S/D – Recreation	
O.J. Jiles	Gold Bottom Gulch	Koyukuk–Nolan	O/P Placer	
Teck Cominco Alaska Inc.	Red Dog Mine	Lisburne	O/P HR	
Walter Lanigan	Big Creek	Chandalar	O/P Placer	
William Nordeen	Emma Creek	Koyukuk–Nolan	O/P Placer and S/D – Recreation	
	WESTERN REGION			
Alfred Johnson	Norton Sound	Cape Nome	S/D – Large	
Alvin Hanson	Boulder Creek	Council–Solomon	O/P Placer and S/D	
Anderson & Sons Mining/Ralph Anderson	n/a	Cape Nome	O/P Placer	
Bering Sub Sea Mining LLC/David McCully	Bering Sea	Cape Nome	S/D – Large	
Beaton Path Mining LLC/Tim Beaton	Nugget Creek, Wilson Creek	Gold Hill–Melozitna	O/P Placer and placer exploration	
Benjirmen Kilgore	Norton Sound	Cape Nome	S/D – Recreation	
Billy Howell Jr.	Norton Sound	Cape Nome	S/D – Large	
Clifton McHenry and Randall Smith	Norton Sound	Cape Nome	S/D – Large	
Craig Coggins	Norton Sound	Cape Nome	S/D – Large	
Curtis Roche	Offshore Nome Public Beach	Cape Nome	S/D – Recreation	
Dan Fair	Kelly Pup	Koyukuk–Hughes	O/P Placer	
Douglas Martinson	Dry Creek, Newton Creek	Cape Nome	O/P Placer	
Frank McFarland	Bering Sea	Cape Nome	S/D – Large	
Gold Diggers/Shawn Pomrenke	Cape Nome	Cape Nome	S/D	
Gold Prospectors Association of America/Ken Rucher	Nome area	Cape Nome	S/D – Recreation	
Green Resources LLC	Davis Creek, tributary of South Fork Koyukuk River	Koyukuk–Hughes	O/P Placer	
Ian Foster	Norton Sound	Cape Nome	S/D – Recreation	
James and Kathleen Hansen	Bering Sea	Cape Nome	S/D – Large	
Joey Comoza	Norton Sound	Cape Nome	S/D – Large	
John Mehelich	Norton Sound	Cape Nome	S/D – Large	
K & S Leasing Inc./Norman Stalls	Nome Offshore	Cape Nome	S/D – Large	
Kenneth Takak	Ungalik River, Tubutulik River	Koyuk	S/D – Recreation	
Lawrence Essad	Norton Sound	Cape Nome	S/D – Recreation	
Lonnie Fauset	Norton Sound	Cape Nome	S/D – Recreation	

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S/D - Recreation = small suction dredge and recreational operations. Prepared from list of permitted operations; not all produced during the year.

OPERATOR	CREEK OR MINE	DISTRICT	TYPE[a]	E
Maclsh Mining, LLC/Ronald MacLaren	Chapman Creek	Koyukuk–Hughes	O/P Placer	
Mark Gumaer	Dick Creek	Serpentine	O/P Placer	
N.B. Tweet & Sons, LLC/N.B. Tweet	Kougarok River	Kougarok	O/P Placer	
Niagara, Inc./George Livermore	Kougarok River	Kougarok	O/P Placer	
Nome Alaska Gold Concentrates	Anvil Creel	Cape Nome	O/P Placer	
Rayson LLC/Gary Gustafson	Norton Sound	Cape Nome	S/D – Large	
Rex Isaacson	Norton Sound	Cape Nome	S/D – Recreation	
Richard Markley	Norton Sound	Cape Nome	S/D – Large	
Richard Redmond	Macklin Creek	Kougarok	O/P Placer	
Robin Gumaer	Dick Creek	Serpentine	O/P Placer	
Samuel "Kelly" Thomas	Sweepstakes Creek	Koyuk	O/P Placer	
Steve Phillips	Norton Sound/Bering Sea	Cape Nome	S/D – Recreation	
Taiga Mining Company Inc./Jerry Birch	Aloha Creek, Clear Creek	Koyukuk–Hughes	O/P Placer	
Victor Loyer	Near Candle Creek	Fairhaven	O/P Placer	
Wesley DeVore	Norton Sound	Cape Nome	S/D – Large	
	EASTERN INTERIOR REGION			
A.J. Davis	Cherry Creek	Fortymile	O/P Placer	
AK Team GS LLC	Uhler Creek	Fortymile	O/P Placer	
Andy Miscovich	Wolf Creek	Fairbanks	O/P Placer	
Arctic Mining LLC/Morris Wolters	Crooked Creek	Circle	O/P Placer	
Brian Asplund	Deadwood Creek	Circle	O/P Placer	
Bruce Herning	Palmer Creek	Fairbanks	S/D – Recreation	
C.J. Hill	Lost Chicken Creek	Fortymile	O/P Placer	
Cannon Resources, LLC	Unnamed tributary of Fish Creek	Bonnifield	O/P Placer	
CCR Mining LLC/Creighton Lapp	Mammoth Creek, Stack Pup	Circle	O/P Placer	
Charles "Dick" Hammond	Chicken Creek, 45 Pup	Fortymile	O/P Placer	
Charles Zimmerman	Killarney Creek, Irish Gulch	Hot Springs	O/P Placer	
Chris Groppel	Tenderfoot Creek	Richardson	O/P Placer	
Cy Bras	Canyon Creek, Squaw Gulch	Fortymile	O/P Placer	
Dave Eberhardt	Nugget Creek	Fairbanks	O/P Placer	
Dave Likins	Fortymile River	Fortymile	O/P Placer	
David Hatch and Sonya Simon	Dome Creek	Fortymile	O/P Placer	
David Jacobs	Moose Creek	Bonnifield	O/P Placer	
David Jacobs	Eva Creek, Wilson Creek	Fairbanks	O/P Placer	
David Smith	Flat Creek	Fairbanks	O/P Placer	
David Wegner	North Fork Fortymile River	Fortymile	S/D – Large	
Dean Willis	Crooked Creek	Circle	O/P Placer	
DEPEM/Donald Stein	Gilmore Creek, Tom Creek	Fairbanks	O/P Placer	
Dexter Clark	Fox Creek	Fairbanks	O/P Placer	
Don Kiehl	Gold King Creek	Bonnifield	O/P Placer	
Donald Smithwick	Crooked Creek	Eagle	O/P Placer and S/D	
Dyton Gilliland	Jack Wade	Fortymile	S/D – Recreation	
Earl Voyt lla/Voyt lla Mining	Ester Creek	Fairbanks	O/P Placer	
Earth Movers of Fairbanks Inc.	Seat le Creek	Fairbanks	O/P Placer	
Elton McGhan	Kal Creek	Fortymile	O/P Placer	
Eric Kile	Woods Creek, Canyon Creek	Fortymile	O/P Placer	
Ernest Johnson	Rhode Island Creek	Hot Springs	O/P Placer	
Fairbanks Excavation	Smallwood Creek	Fairbanks	O/P Placer	
Fairbanks Gold Mining Inc.	Fort Knox Mine	Fairbanks	O/P HR	
Frank Morrison III	Big Eldorado Creek	Fairbanks	O/P Placer	
Fred and Marianne Campbell	Jack Wade	Fortymile	S/D – Recreation	
Gene Hume	Switch Creek	Circle	O/P Placer	
George and Linda Montgomery	Bonanza Creek	Fairbanks	O/P Placer	
Geoquest/Michael Busby	Chicken Creek, Myers Fork	Fortymile	O/P Placer	

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OPERATOR	CREEK OR MINE	DISTRICT	TYPE[a]	E
Gerald and Kathryn Pitcher	Deadwood Creek	Circle	S/D – Recreation	
Golden Boyz, LLC/Kathy Penell	Little Boulder Creek	Hot Springs	O/P Placer	
Gordon Olson	Jack Wade Creek	Fortymile	S/D – Recreation	
Guy Mathews, Marjorie Carlson, and Ron Gries	McArthur Creek	Chisana–Nabesna	O/P Placer	
Hans Sobanja	Rebel Creek	Circle	O/P Placer	
Howard Sipes	Unnamed creek	Tok	O/P Placer	
Jackson Mining Company/Roy Traxler	Totatlanika River	Bonnifield	O/P Placer	
James Dahl	Gold Dust Creek	Circle	O/P Placer	
James Decker	Sheep Creek	Bonnifield	O/P Placer	
James Shriner	Deadwood Creek	Circle	S/D – Recreation	
James Stone/Pacific Mining Co.	Porcupine Creek	Circle	Placer exploration	
James Treesh	No name – near Cherry Creek	Fortymile	O/P Placer	
Jason Minekome, Kenneth Fox, Gerald Brilke, Ken Foy	Walker Fork Fortymile River	Fortymile	O/P Placer	
Jean Turner and Randy Powelson	Fox Creek	Fairbanks	O/P Placer	
Jeff Owen	Davis Creek	Fortymile	O/P Placer	
Jeff Owen	Walker Fork Fortymile River	Fortymile	O/P Placer	
Jeffrey and Laura Thimsen	Upper Woods Creek	Fortymile	O/P Placer	
Jerry Hassel	Ready Bullion Creek	Fairbanks	O/P Placer	
Jim Holmes	Dome Creek	Fairbanks	O/P Placer	
John and Dawn Lines/Aurora Mining	North Fork Harrison Creek	Circle	O/P Placer	
John McClain	Kokomo Creek	Fairbanks	O/P Placer	
John Shilling	Thanksgiving Creek	Hot Springs	O/P Placer	
Judd Edgerton	Napoleon Creek	Fortymile	O/P Placer	
L & L Mining/ Clayton Lapp	Eagle Creek	Circle	O/P Placer	
Larry Crouse	Fox Gulch	Fairbanks	O/P Placer	
Leo Regner	Lilliwig Creek	Fortymile	O/P Placer	
Michael Fulton and Doug Marks	Butte Creek	Circle	S/D – Recreation	
Michael Williams and Guy A. Mathews	McArthur Creek	Fortymile	O/P Placer	
Mickey Jones and Gary L. Freeland	Mosquito Fork	Fortymile	O/P Placer	
Miller Creek Mining Co./Fred Wilkinson	Ketchem Creek	Circle	O/P Placer	
Mudminers, LLC	Wonder Creek, Livengood Creek	Tolovana–Livengood	O/P Placer	
Mudminers, LLC	Miller Gulch	Hot Springs	O/P Placer	
Nancy and Harry Dillon	Deadwood Creek	Circle	O/P Placer	
Nelson Mining Co./Larry Nelson	Livengood Creek	Tolovana–Livengood	O/P Placer	
Otto and Griswold Stoeppler	Eureka Creek	Hot Springs	O/P Placer	
Paul & Co./Paul Manuel	Fairbanks Creek	Fairbanks	O/P Placer	
Paul and Teresa Hunstiger	Fortymile River	Fortymile	S/D – Large	
Peter Frantz	Vault Creek	Fairbanks	O/P Placer	
Polar Mining/Daniel May	Goldstream Creek	Fairbanks	O/P Placer	
R & M Mining/ Raymond Lester and Mike Lester	Birch Creek	Circle	O/P Placer	
Raleigh Cline	Eagle Creek	Fortymile	O/P Placer	
Raymond Meder	Flume Creek	Fairbanks	O/P Placer	
Richard Loud	North Fork and South Fork Harrison Creek	Circle	O/P Placer	
Richard Ott	Omega Creek	Hot Springs	O/P Placer	
Richard Wilder and Karen Wilder	Little Boulder Creek	Hot Springs	O/P Placer	
Richardson Shield LLC/Alan Las	Smith Creek, Pool Creek	Fairbanks	O/P Placer	
Robert Emerson	No stream on property	Fairbanks	O/P Placer	
Robert Hare	Gold Dust Creek	Circle	O/P Placer	
Robert Roman	Eureka, Glenn, Rhode Island creeks	Hot Springs	O/P Placer	
Robin and Wanda Severson	Willow Creek	Fortymile	O/P Placer	
Roger Larson	Main Stem Fortymile River	Fortymile	S/D – Large	

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OPERATOR	CREEK OR MINE	DISTRICT	TYPE[a]
Ronald Bergh	Salcha River	Fairbanks	O/P Placer
Sam and Donna Skidmore	Vault Creek	Fairbanks	Placer exploration
Sam Koppenberg	Hunter Creek	Rampart	O/P Placer
Scott Thomas	Deadwood Creek	Circle	O/P Placer
Seufferft Mining Company/George Seufferft, Jr.	Faith Creek	Fairbanks	O/P Placer
Sheldon and Janine Maier	Montana Creek	Fortymile	O/P Placer
Sherlund Mining, LLC/Rick Sherlund	Ketchem Creek	Circle	O/P Placer
Silver Jim Stroer	Confederate Creek	Fortymile	O/P Placer
Slate Creek Mining/Steve Adams	Slate Creek	Rampart	O/P Placer
Stanley Gelvin	Crooked Creek	Circle	O/P Placer
Sumitomo Metal Mining Pogo LLC	Pogo Mine	Goodpaster	U/G HR
Terry Russell	Boulder Creek	Hot Springs	O/P Placer
Tillicum Resources Inc./Fred Cornelius and Gerald Erickson	Fox Creek	Fairbanks	O/P Placer
Timothy Kelly/ Kelly Mining	North Fork Creek	Hot Springs	O/P Placer
Timothy Ruppert	Little Moose Creek	Bonnifield	S/D – Recreation
TonoGold Resources Inc./Alan Las	No Grub Creek, The Lost Mine	Fairbanks	O/P Placer
Walter Bohan, William Bohan, Dawn Miller	Ottertail Creek	Fairbanks	S/D – Large and S/D – Recreation
Walter Stockwell	Tenderfoot Creek	Richardson	O/P Placer
William Aldridge	Poker Creek	Fortymile	O/P Placer
William Bayless	Franklin Creek	Fortymile	O/P Placer
William Miller	Jack Wade	Fortymile	S/D – Recreation
Yellow Metal Exploration and Mining/ Jack Barnes	Baby/Kal Creek, Squaw Gulch	Fortymile	O/P Placer and S/D
	SOUTHCENTRAL REGION		
Allen Brandon, Donna Allen, and Darlene McMahan	N/A	Valdez Creek	O/P Placer
Birch Yuknis	Pass Creek	Yentna–Cache Creek	O/P Placer
Brian Berkhahn	Mills Creek	Hope	S/D – Recreation
Busch Creek Mining/Dennis Boyce	Busch Creek	Valdez Creek	O/P Placer
Carl Wilbur	Yacko Creek	Nelchina	O/P Placer
Clearwater Mountain Mining	White Creek	Valdez Creek	O/P Placer
Daniel Hartman	Cache Creek	Yentna–Cache Creek	O/P Placer
Daneil Rodrigue	Tyone Creek	Valdez Creek	O/P Placer
David Burch	Canyon Creek	Hope–Sunrise & Seward	O/P Placer
David Howland	Dry channel	Chistochina	O/P Placer
Dennis Jameson	East Fork Sixmile Creek	Hope–Sunrise & Seward	S/D – Large
Earle Foster	Wet Gulch	Willow Creek–Hatcher Pass	S/D – Recreation
Fred Wilkes and Robert Bradford	Bird Creek	Yentna–Cache Creek	O/P Placer
Gerald and Velma Holly	Peters Creek	Yentna–Cache Creek	O/P Placer
Gordon Bartel and Robert Haines	Mills Creek	Yentna–Cache Creek	O/P Placer
Gordon Richmond	Buchia Creek	Valdez Creek	O/P Placer
Gordon Wolfferft	Peters Creek	Yentna–Cache Creek	O/P Placer
Jeanard and Brendt Aafedt	Yacko Creek	Nelchina	O/P Placer
Kenneth Lee	Cache Creek	Yentna–Cache Creek	O/P Placer and S/D – Recreation
Louis "Tim" Geiermann	Bird Creek	Yentna–Cache Creek	O/P Placer
Michael Kingsbury	White Creek	Valdez Creek	O/P Placer
New Recovery Systems/Estelli DeWitt	Alfred Creek	Willow Creek	S/D – Recreation
North American Mining LLC/Steve Sneed	Peters Creek	Yentna–Cache Creek	O/P Placer
Patricia McKenzie	Canyon Creek	Hope–Sunrise &	S/D – Recreation

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OPERATOR	CREEK OR MINE	DISTRICT	TYPE[a]	E
		Seward		
Steve and Patricia Lankford	Albert Creek	Nelchina	O/P Placer	
Steven Priddle and John Chamberlain	Roosevelt Creek	Valdez Creek	O/P Placer	
Thomas Sternberg	Quartz Creek	Hope–Sunrise & Seward	S/D – Recreation	
Tod Bauer	Dry, Cottonwood, Peter creeks	Yentna–Cache Creek	O/P Placer	
William Stock	White Creek	Valdez Creek	O/P Placer	
	SOUTHWESTERN REGION			
Clark–Wiltz Mining Ganes Creek Recreational/Doug Clark	Ganes Creek and tributaries	Innoko–Tolstoi–Ophir	O/P Placer	
Daniel Plano	Anvil Creek/Innoko River	Innoko–Tolstoi–Ophir	O/P Placer	
David "Larry" Wilmarth	George River, Julian Creek	Aniak–Tuluksak	S/D – Large	
Harry Faulkner	Ophir Creek	Aniak–Tuluksak	O/P Placer	
L.E. Wyrick	Granite Creek	Aniak–Tuluksak	O/P Placer	
LeRoy Busk and Richard Busk	Syneeva Creek	Aniak	O/P Placer	
Little Creek Mine/Paul Sayer	Bedrock Creek	Innoko–Tolstoi–Ophir	O/P Placer	
Mark Matter	Marvel Creek	Aniak–Tuluksak	O/P Placer	
Moore Creek Pay to Mine LLC/Roger Cowes, Agent	Moore Creek	Innoko–Tolstoi–Ophir	O/P Placer and S/D – Recreation	
Neil Rosander	Cripple Creek	Innoko–Tolstoi–Ophir	O/P Placer	
NYAC Mining Co.	Shamrock Creek	Aniak–Tuluksak	O/P Placer	
Rosander Mining Company Inc.	Colorado Creek	Innoko–Tolstoi–Ophir	O/P Placer	
Spencer and Carolyn Lyman	Crooked Creek	Iditarod	O/P Placer	
Strandberg & Sons/ Sigvald Strandberg	Montana Creek, Creston Creek, Colorado Creek	Innoko	O/P Placer	
XS Platinum Inc.	Salmon River and tributaries	Goodnews Bay	O/P Placer	
	SOUTHEASTERN REGION			
Big Nugget Mine/John Schnabel	Porcupine Creek	Porcupine	O/P Placer	
Coeur Alaska Inc.	Kensington Gold Mine	Berners Bay	U/G HR	
Hecla Greens Creek Mining Company	Greens Creek Mine	Juneau & Admiralty Island	U/G HR	
Mark Sebens	Porcupine Creek	Juneau & Admiralty Island	O/P Placer	
	ALASKA PENINSULA REGION			
Wayne Murphy	Beach Sands – Kodiak	Kodiak–Unga Island	O/P Placer	

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APPENDIX C
Alaska mining websites
Mining and Exploration Companies

Accelergy Corp.	http://www.accelergy.com/
Advanced Explorations Inc.	http://www.advanced-exploration.com/
Agnico–Eagle USA Ltd.	http://www.agnico-eagle.com/
Alaska Earth Sciences Inc.	http://www.aes.alaska.com/
Alix Resources Corp.	http://www.alixresources.com/
Anchorage Sand and Gravel Co. Inc.	http://www.anchsand.com/
Andover Ventures Inc.	http://www.andoverventures.com/
Anglo American plc	http://www.angloamerican.co.uk/
Anglo American Exploration (USA) Inc.	http://www.angloamerican.ca/
Antofagasta Minerals PLC	http://www.antofagasta.co.uk/
Ashburton Ventures Inc.	http://www.ashburtonventures.com/
Avalon Development Corp.	http://www.avalonalaska.com
Barrick Gold Corp.	http://www.barrick.com/
BHP Billiton Ltd.	http://www.bhpbilliton.com/
Black Range Minerals Ltd.	http://www.blackrangeminerals.com/
Bravo Venture Group Inc.	http://www.bravoventuregroup.com/
Bret Resources Inc.	http://www.bretresources.com/s/home.asp
Brixton Metals Corp.	http://www.brixtonmetals.com/
Browns Hill Quarry	http://www.bricecompanies.com/quarry.html
Caribou Copper Resources Ltd.	http://www.cariboucopper.com/
Cedar Mountain Exploration Inc.	http://www.cedarmountainexp.com/
Century Mining Corp.	http://www.centurymining.com
Clark–Wiltz Mining	http://www.clark-wiltz.com/
Coeur d'Alene Mines Corp. (Coeur Alaska Inc.)	http://www.coeur.com/
Constantine Metal Resources Ltd.	http://www.constantinemetals.com/
Contango Oil & Gas Co.	http://www.contango.com/
Copper Ridge Explorations Inc.	http://www.copper-ridge.com/
Corvus Gold Inc.	http://www.corvusgold.com/
Crescent Resources Corp.	http://www.crescentresourcescorp.com/
Diamond Gold Corp.	http://diamondgoldcorp.com/
Donlin Creek LLC	http://www.donlingold.com/
Endurance Gold Corp.	http://www.endurancegold.com/
Fire River Gold Corp.	http://www.fireriver gold.com/
First Star Resources Inc.	http://firststarresources.ca/
Freegold Ventures Ltd.	http://www.freegoldventures.com/
Full Metal Minerals Ltd.	http://www.fullmetalminerals.com/
Geocom Resources Inc.	http://www.geocom-resources.com
Geohedral LLC	http://beardco.com/investor-relations/press-releases
Geoinformatics Exploration Inc.	http://www.kiskametals.com/
Georgetown Capital Corp.	http://georgetowncapital.com/
Gold Crest Mines Inc.	http://www.goldcrestminesinc.com/
Goldrich Mining Co. (Little Squaw Gold Mining Co.)	http://www.goldrichmining.com/
Grand Portage Resources Ltd.	http://www.grandeportage.com/
Grayd Resource Corp.	http://www.grayd.com/
Great Basin Gold Ltd.	http://www.greatbasingold.com/
Great Northwest Inc.	http://www.grtnw.com/
Greens Creek Mining Co.	http://www.greenscreek.com/
Heatherdale Resources Ltd.	http://www.heatherdaleresources.com/
Hecla Mining Co.	http://www.hecla-mining.com/
Hinterland Metals Inc.	http://www.hinterlandmetals.com/
Hunter Dickinson Inc.	http://www.hdimining.com/
International Tower Hill Mines Ltd. (Talon Gold [US] LLC)	http://www.ithmines.com/
Itochu Corp.	http://www.itochu.co.jp/en/
Japan Oil, Gas, and Metals National Corp. (JOGMEC)	http://www.jogmec.go.jp/english/
Kennecott Exploration Co.	http://www.riotinto.com/
Kinross Gold Corp. (Fairbanks Gold Mining Inc.)	http://www.kinross.com/

Kiska Metals Corp.	http://kiskametals.com/
Lafarge North America Inc.	http://www.lafargenorthamerica.com/
Laurus Energy Inc.	http://laurusenergy.com/
Liberty Star Gold Corp.	http://www.libertystaruranium.com/
Linux Gold Corp.	http://www.linuxgoldcorp.com/
Max Resource Corp.	http://www.maxresource.com/
Millrock Resources Inc.	http://www.millrockresources.com/
Miranda Gold Corp.	http://www.mirandagold.com/
New Gold Inc.	http://www.newgold.com/
Newmont Exploration Ltd.	http://www.newmont.com/mining/exploration/
Next Gen Metals Inc.	http://www.nextgenmetalsinc.com/
Niblack Mineral Development Inc.	http://www.niblack.com/
Northern Associates Inc.	http://www.alaskaexploration.com/
Northern Dynasty Minerals Ltd.	http://www.northerndynastyminerals.com/
NovaGold Resources Inc.	http://www.novagold.net/
Ocean Park Ventures Corp.	http://oceanparkventures.com/
Pacific North West Capital Corp.	http://www.pfncapital.com/
Panoramic Resources Ltd.	http://www.panoramicresources.com/
Paradise Valley Inc.	http://www.akpub.com/akttt/parad.html/
Pathfinder Mineral Services	http://www.pathfindermineralservices.com/
Pebble Limited Partnership	http://www.pebblepartnership.com/
Pure Nickel Inc.	http://www.purenickel.com/
Quaterra Resources Inc.	http://www.quaterra.com/
Radius Gold Inc.	http://www.radiusgold.com/
Rimfire Minerals Corp.	http://www.rimfire.bc.ca/
Rio Tinto Ltd.	http://www.riotinto.com/
Rubicon Minerals Corp.	http://www.rubiconminerals.com/
Ryan Gold Corp.	http://www.ryangold.com/
Select Resources Corp. (Tri-Valley Corp.)	http://www.tri-valleycorp.com/mineral-projects/
Senator Minerals Inc.	http://www.senatorinc.com/
Silverado Gold Mines Ltd.	http://www.silverado.com/
Sisyphus Consulting	http://www.sisyphus-consulting.com/
Stone Horn Ridge LLC	http://www.cirienergy.com/
Sumitomo Metal Mining Co. Ltd	http://www.sumitomocorp.co.jp/english/
Teck Resources Ltd.	http://www.teck.com/
Terra Mining Corp.	http://www.terraminingcorp.com/news.html/
Teryl Resources Corp.	http://www.terylresources.com/
Tintina Gold Resources Inc.	http://www.tintinagold.com/
TNR Gold Corp.	http://www.tnrgoldcorp.com/
Triton Gold Ltd.	http://www.tritongold.com.au/
Ucore Rare Metals Inc.	http://ucore.com/
Usibelli Coal Mine Inc.	http://www.usibelli.com/
Western Standards Metal Ltd.	http://www.terracogold.com/
XS Platinum Ltd.	http://amarantmining.com/xs_platinum__alaska.html
Zazu Metals Corp.	http://www.zazumetals.com/

Alaska Native Corporations

Ahtna Inc.	http://www.ahtna-inc.com/
Aleut Corp.	http://www.aleutcorp.com/
Arctic Slope Regional Corp.	http://www.asrc.com/
Bering Straits Native Corp.	http://www.beringstraits.com/
Bristol Bay Native Corp.	http://www.bbnc.net/
Calista Corp.	http://www.calistacorp.com/
Chugach Alaska Corp.	http://www.chugach-ak.com/
Cook Inlet Region Inc.	http://www.ciri.com/
Doyon Ltd.	http://www.doyon.com/
Koniag Inc.	http://www.koniag.com/
NANA Regional Corp.	http://www.nana.com/
Sealaska Corp.	http://www.sealaska.com/

General

Alaska Miners Association	http://www.alaskaminers.org/
Alaska Division of Geological & Geophysical Surveys	http://dggs.alaska.gov/
Alaska Office of Economic Development	http://www.commerce.state.ak.us/oed/

Alaska's Minerals Data and Information Rescue in Alaska (MDIRA) Project Websites

MDIRA Portal Home Page	http://akgeology.info/
Alaska Geology Map Indexer	http://maps.akgeology.info/
Alaska Mining Claims Information System	http://akmining.info/
Alaska Resource Data Files	http://ardf.wr.usgs.gov/
DGGS Publications On-Line	http://dggs.alaska.gov/pubs/
DNR Sites Related to Mining Applications and Forms	http://dnr.alaska.gov/mlw/forms/
Alaska Mining License Tax Forms	http://www.tax.alaska.gov//programs/index.aspx/
DNR Production Royalty Form	http://dnr.alaska.gov/mlw/forms/mining/royalty_fm.pdf/
Guide to Alaska Geologic and Mineral Information	http://dggs.alaska.gov/pubs/id/3318/
Land Records Web Application	http://plats.landrecords.info/index.html/
NURE Data	http://pubs.usgs.gov/of/1997/ofr-97-0492/quad_ak/quaditar.htm/
RASS, PLUTO Geochemistry Data	http://pubs.usgs.gov/of/1999/of99-433/
State Map Library	http://dnr.alaska.gov/ssd/lris/gis/gis_maplib/maplib_start.cfm/
State Recorder's Office Search	http://dnr.alaska.gov/ssd/recoff/searchRO.cfm/
State Uniform Commercial Code (UCC) Documents Search	http://dnr.alaska.gov/ssd/recoff/searchUCC.cfm/

Recreational Mining Operations

Name of Operation	Mining District	Website
Cache Creek Cabins	Yentna–Cache Creek	http://www.cachecreekcabins.com/
Chicken Gold Camp and Outpost	Fortymile	http://www.chickengold.com/
Clark–Wiltz Mining	Innoko–Tolstoi– Ophir	http://www.clark-wiltz.com/
Crow Creek Gold Mine	Anchorage	http://www.crowcreekmine.com/
Faith Creek Camp	Fairbanks	http://www.angelfire.com/ak5/faithcreekgold/index.html/
Gold Prospectors Association of America	Cape Nome	http://www.goldprospectors.org/
Paradise Valley	Koyukuk–Nolan	http://www.akpub.com/akttt/parad.html/

Mining-Related Business/Tourism/Museum

Name of Operation	Mining District	Website
Circle District Historical Museum	Central	http://www.museumsusa.org/museums/info/1160124
El Dorado Gold Mine	Fairbanks	http://www.eldoradogoldmine.com/
Fairbanks Community Museum	Fairbanks	http://fairbanks-alaska.com/fairbanks-museum.htm/
George Ashby Museum	Copper Center	http://www.museumsusa.org/museums/info/1160126
Gold Dredge No. 8	Fairbanks	http://www.golddredge08.com/
Hope	Hope	http://www.advenalaska.com/
Independence Mine State Park	Willow Creek–Hatcher Pass	http://www.alaskaone.com/independence-mine-state-park/
Juneau Douglas City Museum	Juneau	http://www.juneau.org/parkrec/museum/exhibits/index.htm
Kennecott Copper Mine	Kennecott	http://tps.cr.nps.gov/nhl/detail.cfm?ResourceId=1800&ResourceType=District
Last Chance Mining Museum	Juneau	http://www.museumsusa.org/museums/info/1160155
Pioneer Museum	Fairbanks	http://www.akpub.com/akttt/pione.html/
Pump House Restaurant	Fairbanks	http://www.pumphouse.com/

Skagway National Historic District	Skagway	http://tps.cr.nps.gov/nhl/detail.cfm?ResourceId=714&ResourceType=District
University of Alaska Museum of the North	Fairbanks	http://www.uaf.edu/museum/
Valdez Museum	Valdez	http://www.valdezmuseum.org/
White Pass and Yukon Railway	Skagway	http://www.wpyr.com/

APPENDIX D

Selected significant mineral deposits and mineral districts in Alaska[a]

The alphabetized list of mineral deposits and mineral districts is keyed to the list of explanatory paragraphs that follow. For example, The Lik deposit in the alphabetized list is "**Lik,** 1, (fig. C-1)." This says that the location of Lik is shown as number 1 in figure C-1.

Alaska–Juneau, 100 (fig. C-3)
Anderson Mountain, 54 (fig. C-1)
Aniak district, 84 (fig C-3)
Apex–El Nido, 104 (fig. C-3)
Apollo–Sitka mines, 86 (fig. C-3)
Arctic, 9 (fig. C-1)
Avan Hills, 12 (fig. C-3)
Baultoff, 75 (fig. C-2)
Bear Mountain, 21 (fig. C-2)
Big Creek/Ladue, 58 (fig. C-1)
Big Hurrah, 32 (fig. C-3)
Binocular and other prospects, 72 (fig. C-1)
Bohemia Basin, 103 (fig. C-3)
Bokan Mountain, 122 (fig. C-3)
Bonanza Creek, 45 (fig. C-2)
Bond Creek, 73 (fig. C-2)
Bonnifield district massive sulfide deposits, 54 (fig. C-1)
Bornite, 8 (fig. C-1)
Brady Glacier, 98 (fig. C-3)
BT, 54 (fig. C-1)
Buck Creek, 23 (fig. C-2)
Calder Mine, 133 (fig C-2)
Canwell and Nikolai Complex, 140 (fig. C-3)
Cape Creek, 22 (fig. C-2)
Carl Creek, 74 (fig. C-2)
Casca VABM, 53 (fig. C-1)
Castle Island, 111 (fig. C-1)
Chandalar mining district, 17 (fig. C-3)
Chichagof, 101 (fig. C-3)
Chistochina, 68 (figs. C-2, C-3)
Circle mining district, 52 (fig. C-3)
Claim Point, 82 (fig. C-3)
Coal Creek, 63 (fig. C-2)
Copper City, 119 (fig. C-1)
Cornwallis Peninsula, 110 (fig. C-1)
Council mining district, 33 (fig. C-3)
Delta massive sulfide belt, 55 (fig. C-1)
Denali prospect, 67 (fig. C-1)
Dolphin, 49e (fig. C-3)
Donlin Creek, 137 (fig. C-3)
Drenchwater, 3 (fig. C-1)
Dry Creek, 54 (fig. C-1)
Duke Island, 141 (fig. C-3)
Eagle Creek, 34 (fig. C-3)
Ear Mountain, 25 (fig. C-2)
Ellamar, 78 (fig. C-1)
Ernie Lake (Ann Creek), 15 (fig. C-1)
Esotuk Glacier, 20 (fig. C-2)
Fairbanks mining district, 49 (fig. C-3)
Fairhaven/Inmachuk district, 39 (fig. C-3)
Fort Knox, 49a (fig. C-3)
Fortymile mining district, 60 (fig. C-3)
Frost, 7a (fig. C-1)
Funter Bay mining district, 99 (fig. C-3)
Galena Creek, 21a (fig. C-1)
Gil Claims, 49f (fig. C-3)
Ginny Creek, 4 (fig. C-1)
Golden Zone mine, 64 (figs. C-1, C-3)
Goodnews Bay, 85 (fig. C-3)
Grant Mine, 49c (fig. C-3)
Greens Creek, 105 (fig. C-1)
Groundhog Basin, 112 (fig. C-1)
Haines Barite/Palmer, 95 (fig. C-1)
Hannum, 27 (fig. C-1)
Hirst Chichagof, 101 (fig. C-3)
Horsfeld, 76 (fig. C-2)
Hot Springs mining district, 47 (figs. C-2, C-3)
Hyder mining district, 117 (figs. C-1, C-2)
Iditarod district, 43 (fig. C-3)
Illinois Creek, 132 (figs. C-1, C-3)
Independence, 79 (fig. C-3)
Independence Creek, 28 (fig. C-1)
Inmachuk River, 39 (fig. C-3)
Innoko–Tolstoi mining district, 44 (fig. C-3)
Ivanof, 88 (fig. C-2)
Jimmy Lake, 94 (fig. C-1)
Johnson River, 125 (fig. C-3)
Jualin, 128 (fig. C-3)
Jumbo, 118 (fig. C-1)
Kaiyah, 138 (fig. C-3)
Kantishna mining district, 61 (fig. C-3)
Kasaan Peninsula, 114 (fig. C-1)
Kasna Creek, 92 (fig. C-1)
Kemuk Mountain, 123 (fig. C-3)
Kennecott deposits, 71 (fig. C-1)
Kensington, 127 (fig. C-3)
Kivliktort Mountain, 5a (fig. C-1)
Klery Creek, 14 (fig. C-3)
Klukwan, 96 (fig. C-3)
Kougarok Mountain, 26 (fig. C-2)
Koyukuk–Hughes mining district, 42 (fig. C-3)
Koyukuk–Nolan mining district, 16 (fig. C-3)
Latouche, Beatson, 80 (fig. C-1)
Liberty Bell, 54 (fig. C-1)
Lik, 1 (fig. C-1)
Livengood–Tolovana mining district, 48 (fig. C-3)
Lost River, 24 (fig. C-2)
Lucky Shot, 79 (fig. C-3)
McLeod, 124 (fig. C-2)
Mertie Lode, 99 (fig. C-3)
Midas mine, 77 (fig. C-1)
Mike deposit, 90 (fig. C-2)
Mirror Harbor, 102 (fig. C-3)
Misheguk Mountain, 13 (fig. C-3)
Money Knob/Livengood, 48a (fig. C-3)
Mosquito, Peternie, 56 (fig. C-2)
Mt. Prindle, 50 (fig. C-3)
Nabesna mine, 69 (fig. C-3)
Niblack, 121 (fig. C-1)
Nim prospect, 65 (fig. C-1)
Nimiuktuk River, 126 (fig. C-1)
Nixon Fork, 135 (fig. C-3)
Nome mining district, 30 (fig. C-3)
Nunatak, 97 (fig. C-2)
Omalik, 35 (fig. C-1)
Omar, 7 (fig. C-1)
Orange Hill, 73 (fig. C-2)
Pebble Copper, 129 (fig. C-1)
Placer River, 38 (fig. C-2)
Pleasant Creek, 53 (fig. C-1)
Pogo, 130 (fig. C-3)
Poovookpuk Mountain, 40 (fig. C-2)
Porcupine Lake, 18 (fig. C-2)
Purcell Mountain, 41 (fig. C-2)
Pyramid, 87 (fig. C-2)
Quartz Creek, 37 (fig. C-1)
Quartz Hill, 120 (fig. C-2)
Red Bluff Bay, 109 (fig. C-3)
Red Devil, 83 (fig. C-3)
Red Dog, 2 (fig. C-1)
Red Mountain, 82 (fig. C-3)
Rex deposit, 91 (fig. C-2)
Rock Creek, 31 (fig. C-3)
Rua Cove, 81 (fig. C-1)
Ruby mining district, 46 (fig. C-3)
Ryan Lode, 49b (fig. C-3)
Salt Chuck, 115 (fig. C-3)
Sheep Creek, 54 (fig. C-1)
Shotgun Hills, 131 (fig. C-3)
Shulin Lake, 139 (fig. C-3)
Sinuk River region, 29 (fig. C-1)
Slate Creek, 59 (fig. C-3)
Sleitat Mountain, 93 (fig. C-2)
Smucker, 11 (fig. C-1)
Snettisham, 107 (fig. C-3)
Snipe Bay, 113 (fig. C-3)
Solomon mining district, 33 (fig. C-3)
Spirit Mountain, 70 (fig. C-3)
Stampede mine, 62 (fig. C-3)
Story Creek, 5 (fig. C-1)
Sumdum, 106 (fig. C-1)
Sun, 10 (fig. C-1)
Taurus, 57 (fig. C-2)
Three Castle Mountain, 53 (fig. C-1)
Tracy Arm, 108 (fig. C-1)
True North, 49d (fig. C-3)
Twin Mountain, 51 (fig. C-2)
Union Bay, 116 (fig. C-3)
Valdez Creek district, 66 (fig. C-3)
Vinasale Mountain, 134 (fig. C-3)
Virginia Creek, 54 (fig. C-1)
Von Frank Mountain, 136 (fig. C-3)
War Baby, 79 (fig. C-3)
Weasel Mountain, Bee Creek, 89 (fig. C-2)
Whoopee Creek, 6 (fig. C-1)
Willow Creek, 79 (fig. C-3)
Wind River, 19 (fig. C-1)
Windy Creek, 36 (fig. C-2)
Zackly, 67a (fig. C-1)

[a]This generalized summary does not describe all of the 7,000 known mineral occurrences in Alaska.

NOTE: The U.S. Geological Survey publishes descriptions of mines, prospects, and mineral occurrences in the Alaska Resource Data File (ARDF) for individual USGS 1:250,000-scale quadrangles in Alaska and as a single composite database. These records are found at http://ardf.wr.usgs.gov/. Other records and information on Alaska mineral occurrences can be found at http://akgeology.info/.

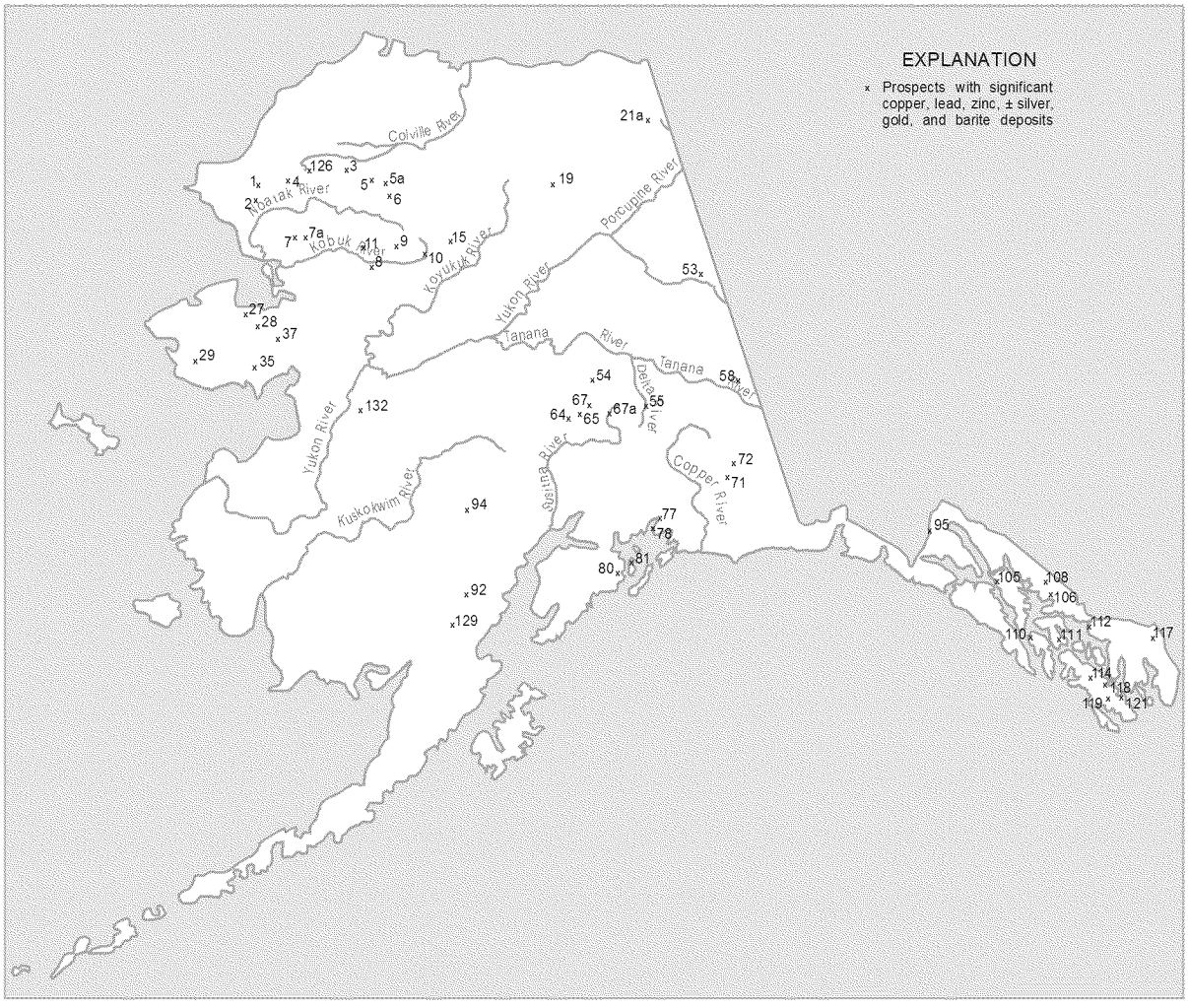


Figure C-1. Significant copper, lead, zinc with credits of silver, gold, and barite deposits in Alaska, 2010.

Map no.

1 **Lik**—Major stratabound massive sulfide (Zn–Pb–Ag–Ba) deposit in black shale and chert. Indicated resource of Lik South is 20.66 million tons of 8.08% Zn, 2.62% Pb, and 1.54 oz/ton Ag. Total inferred resources for Lik South and Lik North deposits is 7.07 million tons of 9.10% Zn, 3.03% Pb, and 1.39 oz/ton Ag (fig. C-1).

2 **Red Dog**—At least five major stratabound massive sulfide deposits hosted in Pennsylvanian or Mississippian shale; similar to locality 1. Mining from 1989 to 2010 produced 10.1 million tons of Zn, 1.90 million tons of Pb, and 108.3 million oz Ag. Deposits, with announced reserves from 2000, include: (a) The Main deposit at Red Dog, which contains 46.2 million tons of proven ore grading 19.2% Zn, 5.2% Pb, with 2.92 oz/ton Ag; (b) The Aqqaluk deposit, which contains probable, indicated, and inferred reserves of 73.0 million tons grading 15.2% Zn, 4.03% Pb, and 2.17 oz/ton Ag; (c) The Qanaiyaq (formerly named Hilltop) deposit with an indicated reserve of 10.6 million tons grading 17.8% Zn, 5.5% Pb, and 3.41 oz/ton Ag; (d) Inferred resource in the Paalaaq deposit of 14.3 million tons of 15.0% Zn, 4.0% Pb, and 2.63 oz/ton Ag; and (e) Anarraq deposit, discovered in 1999, with an inferred reserve of 19.0 million tons of 15.8% Zn, 4.8% Pb, and 2.07 oz/ton Ag. In early 2010, the Main pit had 4.9 million tons of reserves and the Aqqaluk deposit had 52.7 million tons of reserve. Mining began on the Aqqaluk deposit in 2010 (fig. C-1).

3 **Drenchwater**—Mississippian and Pennsylvanian shales and cherts, which contain three stratabound base metal occurrences spatially related to acid volcanics. The lowest unit, a siliceous mudstone, contains a 2 ft layer with up to 23% Zn. An overlying gray chert contains up to 11% Zn and up to 5% Pb with some Ag in fracture fillings. At the top of the overlying tuffaceous layer, Ag-bearing Zn and Pb mineralization outcrops discontinuously for at least 6,500 ft, and contains up to 26% Zn and 51% Pb in grab samples (fig. C-1).

4 **Ginny Creek**—Epigenetic, disseminated Zn–Pb–Ag deposits with barite in sandstone and shale of

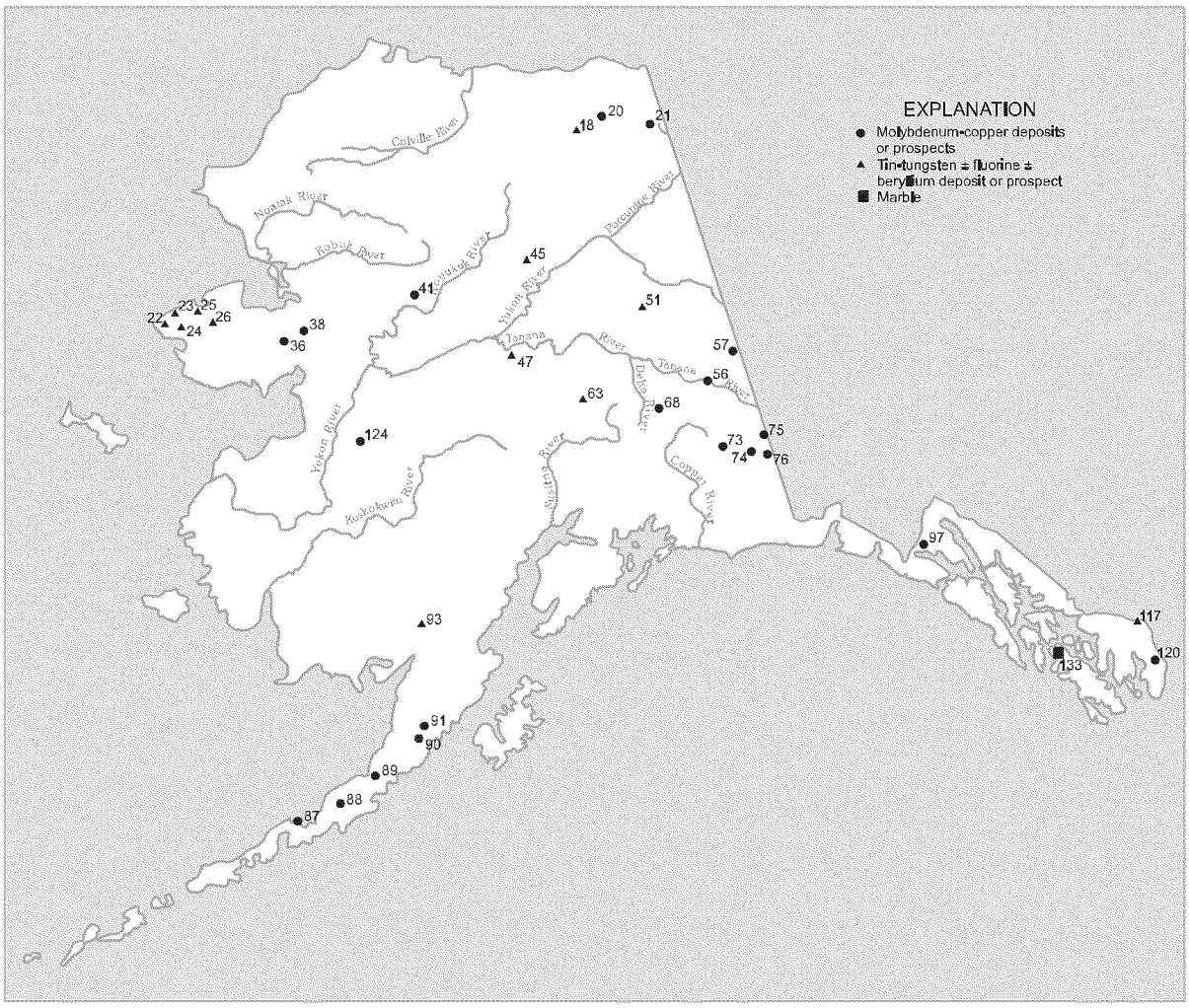


Figure C-2. Significant molybdenum–copper and tin–tungsten with credits of fluorite and beryllium deposits in Alaska, 2010.

Late Devonian through Early Mississippian Noatak Sandstone. Random grab samples of float contain 0.3% to 3.0% Zn and highly variable amounts of Pb and Ag (fig. C-1).

5 **Story Creek**—Epigenetic replacement deposits of Zn–Pb–Ag–Cu–Au hosted in brecciated zones in Devonian Kanayut Conglomerate or Lower Mississippian Kayak Shale. Grab samples of high-grade material contain up to 0.43% Cu, 34% Pb, 28.8% Zn, 0.04 oz/ton Au, and 30 oz/ton Ag (fig. C-1).

5a **Kivliktort Mountain**—Mineralized float is widespread on the north flanks of the mountain, apparently spatially related to the contact between shales at the base of the hills and coarse-grained siliceous clastic rocks on the upper slopes. Rock samples containing up to 30% Zn have been reported (fig. C-1).

6 **Whoopee Creek**—Epigenetic replacement deposits of Zn–Pb–Cu–Ag–Au–Cd in breccia zones in Devonian Kanayut Conglomerate or Lower Mississippian Kayak Shale. Random grab samples of mineralized material contain 0.24% Cu, 0.37% Cd, 46% Zn, 44% Pb, 0.14 oz/ton Au, and 14.8 oz/ton Ag (fig. C-1).

7 **Omar**—Epigenetic replacement deposits of Paleozoic age; include bedded barite occurrences. Grab samples contain 15.3% Cu, 0.15% Pb, 0.95% Zn, 0.05% Co, and 0.3 oz/ton Ag. BLM estimates 35 million tons of 4% Cu (fig. C-1).

7a **Frost**—Possible 9 million tons of barite in pods, lenses, and wavy-banded quartz–calcite–barite veins. Chalcopyrite and galena occur in veins that crosscut Paleozoic limestone and dolomite for a minimum distance of 1 mi. Selected samples contain up to 13.2% Zn (fig. C-1).

8 **Bornite**—Major stratabound Cu–Zn deposit in brecciated carbonate rock of Devonian age; 5.0 million ton orebody contains 4.0% Cu and accessory Zn and Co. Larger reserve estimate of 40 million tons of about 2% Cu and undisclosed amount of Zn and Co. At grade of 1.2% Cu, reserves are 100 million tons (fig. C-1).

9 **Arctic**—Major volcanogenic (Cu–Zn) massive sulfide deposit hosted in sequence of metarhyolite, metatuff, and graphitic schist of Devonian age; indicated

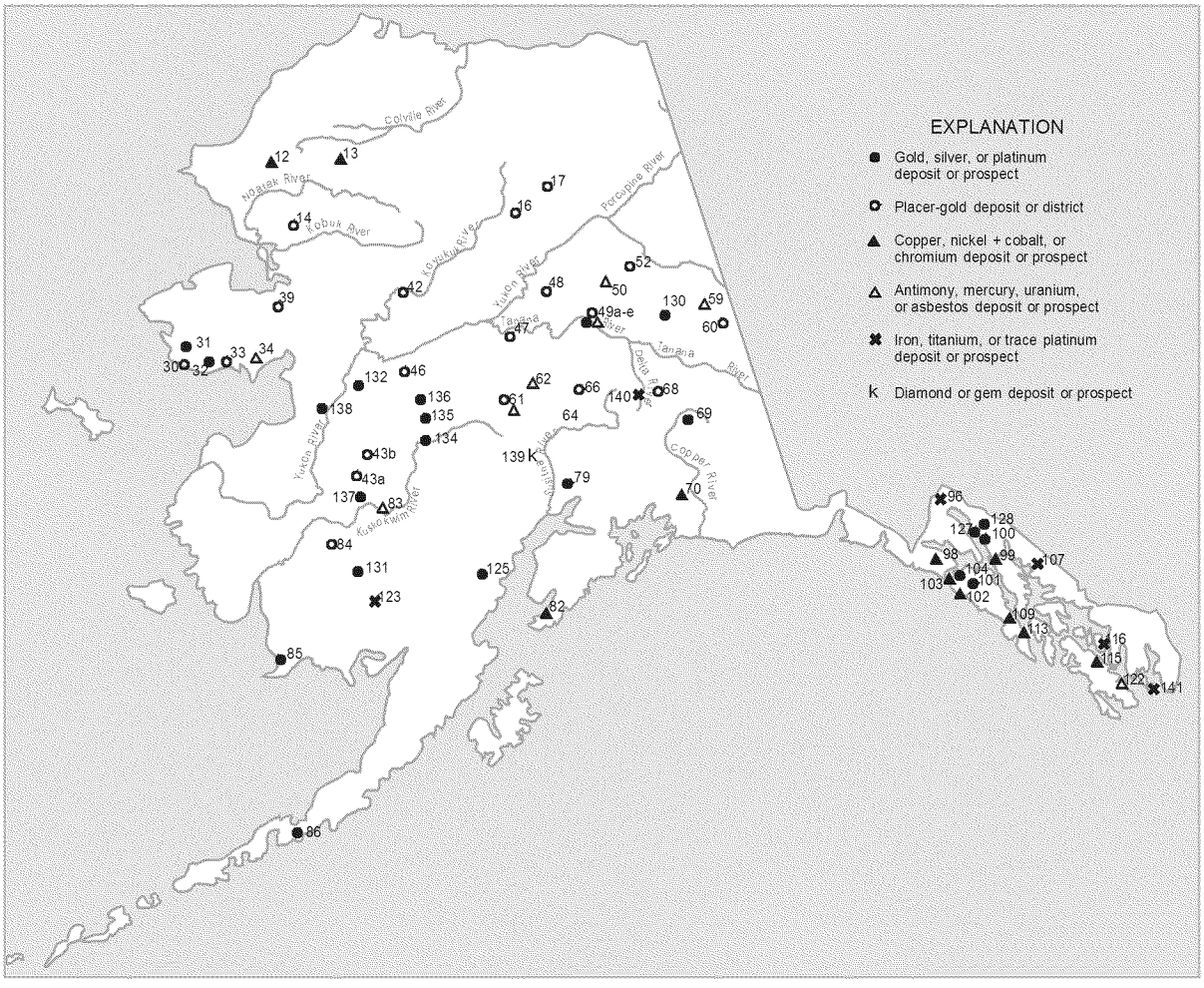


Figure C-3. Significant gold, silver, platinum, and strategic mineral deposits in Alaska, 2010.

reserves of 18.5 million tons grade 4.14% Cu, 6.02% Zn, 0.94% Pb, 1.74 oz/ton Ag, and 0.024 oz/ton Au and inferred resources of 13.3 million tons grade 3.53% Cu, 4.94% Zn, 0.79% Pb, 1.40 oz/ton Ag, and 0.020 oz/ton Au contain 2.5 billion pounds of copper, 3.55 billion pounds of zinc, 562 million pounds of lead, and 51 million ounces of silver (fig. C-1).

10 **Sun**—Major (Cu–Pb–Zn–Ag) massive sulfide deposit in sequence of middle Paleozoic metarhyolite and metabasalt. Average grades are 1–4% Pb, 6–12% Zn, 0.5–7% Cu, and 3–11 oz/ton Ag (fig. C-1).

11 **Smucker** —Middle Paleozoic volcanogenic massive sulfide deposit; 3,000 ft long and up to 190 ft wide; contains significant tonnage of Cu–Pb–Zn ore that grades 1.5% Pb, 5–10% Zn, 3–10 oz/ton Ag, with minor Au (fig. C-1).

12 **Avan Hills**—Disseminated chromite in layered ultramafic rocks; grab samples contain up to 4.3% Cr with 0.015 oz/ton PGM (fig. C-3).

13 **Misheguk Mountain**—Chromite occurrences similar to those in Avan Hills (fig. C-3).

14 **Klery Creek**—Lode and placer Au deposits worked intermittently from 1909 through 1930s. Total production through 1931, mostly from placer deposits, estimated at 31,320 oz Au (fig. C-3).

15 **Ernie Lake (Ann Creek)**—Stratabound massive sulfide occurrence in metarhyolite, metatuff, and marble. Gossan zones strongly anomalous in Cu–Pb–Zn and Ag (fig. C-1).

16 **Koyukuk mining district**—Major placer Au district; from 1893 to 2010 produced an estimated 365,594 oz Au. Gold placers in Nolan Creek mined on surface and underground, both sources of large gold nuggets. Significant deep placer reserves remain (fig. C-3).

17 **Chandalar mining district**—Major Au-producing district; substantial production in excess of 68,838 oz Au through 2010 from lode and placer sources; lode Au found in crosscutting quartz veins that intrude schist and greenstone. Active development of placer deposits and lodes in progress. Inferred lode reserves estimated to be 45,000 tons with grade of 2 oz/ton Au (fig. C-3).

18 **Porcupine Lake**—Stratiform fluorite occurrences and argentiferous enargite, tetrahedrite associated with felsic volcanic rocks of late Paleozoic age. Reported grades of up to 30% fluorite (CaF2) reported, with

grab samples of 4.8% Cu (fig. C-2).

19 **Wind River**—Stratabound Pb–Zn massive sulfide prospects; reported grades of up to 5% Pb (fig. C-1).

20 **Esotuk Glacier**—Disseminated Mo–Sn–W–Pb–Zn mineralization in skarns associated with Devonian(?) schistose quartz monzonite. Grab samples contain up to 0.08% Sn and 0.15% W (fig. C-2).

21 **Bear Mountain**—Major stockwork Mo–W–Sn occurrence in intrusive breccia. Rock samples containing up to 0.8% Mo and 0.6% W occur within a 35-acre area where soil samples average more than 0.2% MoS2, and an adjacent 25-acre area where rubble contains wolframite and soils averaging greater than 0.12% WO3. Rubble crop in this area indicates a Tertiary porphyry system as the source of the Mo and W (fig. C-2).

21a **Galena Creek**—Steeply dipping veins contain up to 21% Cu, 3.5% Zn, and 1.3% Pb with 5.5 oz/ton Ag on the east side of the creek, and on the ridge west of the creek a large area of disseminated mineralization and veinlets contains predominantly Zn (fig. C-1).

22 **Cape Creek**—Major placer Sn producer. More than 500 tons Sn produced from 1935 to 1941; from 1979 to 1990, produced 1,040 tons Sn. Derived from Cape Mountain in contact zone of Cretaceous granite and limestone (fig. C-2).

23 **Buck Creek**—Major placer Sn producer. More than 1,100 tons Sn produced from 1902 to 1953 (fig. C-2).

24 **Lost River**—Major Sn, fluorite, W, and Be deposit associated with Cretaceous Sn granite system. More than 350 tons Sn produced from skarn and greisen lode sources. Measured reserves amount to 24.6 million tons that grade 0.15% Sn, 16.3% CaF2, and 0.03% WO3, based on 45,000 ft of diamond drilling (fig. C-2).

25 **Ear Mountain**—Placer Sn district and Sn–Cu–Au–Ag–Pb–Zn skarn mineralization of Cretaceous age. Area also anomalous in U (fig. C-2).

26 **Kougarok Mountain**—Sn deposit hosted in quartz–tourmaline–topaz greisen of Cretaceous age. Grades may average 0.5% Sn and 0.01% Ta and Nb, but a high-grade resource of 150,000 tons grading 1% + Sn was identified, with incrementally higher tonnage at lower grades (fig. C-2).

27 **Hannum**—Stratiform, carbonate-hosted Pb–Zn–Ag massive sulfide deposit of mid-Paleozoic age in heavily oxidized zone that ranges from 30 to 150 ft thick. Mineralized zone reported to assay up to 10% Pb, 2.2% Zn, 0.04 oz/ton Au, and 1.76 oz/ton Ag (fig. C-1).

28 **Independence Creek**—Pb–Zn–Ag massive sulfide deposit; high-grade ore shipped in 1921 contained 30% Pb, 5% Zn, up to 150 oz/ton Ag. Mineralization restricted to shear zone in carbonates (fig. C-1).

29 **Sinuk River region**—Several Pb–Zn–Ag–Ba–F bearing massive sulfide deposits and layered Fe deposits in carbonate and metavolcanic rocks of Nome Group. Mineralized zones extend over 8,000 ft along strike (fig. C-1).

30 **Nome mining district**—Major placer Au producer. Production from 1897 to 2010 in excess of 5,014,982 oz Au, all from placers. Past Sb and W production (fig. C-3).

31 **Rock Creek**—868,000 oz Au resource, with about 13.23 million tons grading 0.066 oz/ton Au in vein swarms and stringers in an area 1,500 ft long, 500 ft maximum width and 300 ft deep (fig. C-3).

32 **Big Hurrah**—Epigenetic vein deposit in black slate and metasedimentary rocks of the Solomon schist. Deposit contains some W mineralization and has produced more than 27,000 oz Au from nearly 50,000 tons milled ore. Probable reserves and indicated and inferred resources total 2.53 million tons that grade 0.11 oz/ton Au, with credits of Ag and WO3 (fig. C-3).

33 **Solomon and Council mining districts**—Major placer Au districts; produced more than 1,047,028 oz through 2010. Three structurally controlled Au deposits in Bluff area—Daniels Creek, Saddle, and Koyana Creek—contain minimum inferred historical reserves of 6.5 million tons grading 0.1 oz/ton Au (fig. C-3).

34a **Eagle Creek**—U prospect in Cretaceous Kachauik alkalic intrusive rocks. Highly anomalous U concentrations up to 1,000 ppm reported (fig. C-3).

34b **Death Valley (Boulder Creek)**—Sandstone-type U prospect with predominantly epigenetic mineralization. Over 11,000 ft of drilling defined a minimum reserve of 1 million pounds of U3O8 with average grade of 0.27% U3O8 and 9.9 ft thickness within 200 ft of surface (fig. C-3).

35 **Omalik**—Vein-type Pb–Zn–Ag massive sulfide prospect in Paleozoic carbonate rocks; from 1881 to 1900, produced 400 tons of Pb–Zn ore that averaged about 10% Pb and 40 oz/ton Ag. Grades of oxidized Zn ore reported to be up to 34% Zn (fig. C-1).

36 **Windy Creek**—Disseminated Mo–Pb–Zn mineralization in quartz veins and skarn with reported values as high as 0.15% Mo (fig. C-2).

37 **Quartz Creek**—Significant Pb–Zn–Ag mineralization; reported grades of 15% combined Pb–Zn and 10 oz/ton Ag (fig. C-1).

38 **Peace River**—Significant Mo–F mineralization disseminated in intrusive rocks. Reported values of 0.2% Mo (fig. C-2).

39 **Fairhaven/Inmachuk district**—Placer deposits with 603,161 oz production from 1902–2010; significant reserves remaining in a large ancestral channel system. High base-metal sulfide concentrations and U values in concentrates (fig. C-3).

40 **Poovookpuk Mountain**—Porphyry Mo mineralization. Reported grades of up to 0.25% Mo (fig. C-2).

41 **Purcell Mountain**—Mo and Ag occurrences associated with Cretaceous alkalic igneous plutons, alaskite, and bostonite dikes (fig. C-2).

42 **Hughes mining district**—Production of 335,266 oz Au from 1930 to 2010, mainly from Alaska Gold Co. dredge at Hogatza; dredge reactivated in 1981, but deactivated in 1984, and reactivated again in 1990. Non-float mechanized operation on Utopia Creek

produced significant amount of placer Au from 1930 to 1962 (fig. C-3).

43 **Iditarod district**—Major placer Au district; produced 1,564,173 oz Au through 2010. Significant reserves of lode Au and lode W at Golden Horn deposit Chicken Mountain, and other known lodes in region associated with shear zones and monzonite intrusive rocks of Late Cretaceous age (fig. C-3).

44 **Innoko**–Tolstoi mining district—Major placer Au district with significant lode Au–Sb–Hg potential; lode sources are Late Cretaceous volcanic–plutonic complexes and dike swarms that intrude Mesozoic flysch; mining district produced 749,031 oz Au through 2010, almost all from placer deposits (fig. C-3).

45 **Bonanza Creek**—Skarn-type W mineralization along intrusive contact; no published information available (fig. C-2).

46 **Ruby mining district**—Placer Au–Sn district; produced more than 477,976 oz Au from 1931 to 2010; mining district also contains Pb–Ag prospects with grades reportedly as high as 82 oz/ton Ag (fig. C-3).

47 **Hot Springs mining district**—Placer Au–Sn district; produced more than 593,671 oz Au and over 720,000 lb cassiterite through 2010. Includes Eureka and Tofty subdistricts. Magnetite-rich, niobium-bearing carbonatite sill in the Tofty area contains geochemically anomalous Nb, REE, P, and Y (figs. C-2, C-3).

48 **Tolovana mining district**—Placer Au district; produced more than 539,533 oz Au since discovery in 1914 to 2010. Substantial reserves remain primarily on Livengood Bench, a Pliocene ancestral channel (fig. C-3).

48a **Money Knob/Livengood**—Disseminated Au deposit with mineralization in Devonian volcanic and metasedimentary rocks and Cretaceous granitic dike swarm. At a 0.015 oz/ton Au cutoff, has a 2010 indicated resource of 450.4 million tons at grade of 0.024 oz/ton Au (10.9 million ounces) and an inferred resource of 140.1 million tons at grade of 0.023 oz/ton Au (2.4 million ounces). These resources make the Money Knob deposit one of the largest new gold discoveries in North America. The Core and Sunshine zones account for most of the higher-grade resource fig. C-3).

49 **Fairbanks mining district**—Nationally ranked Au-producing district; largest producer in Alaska. Produced about 8,338,059 oz Au from placer deposits (1902–2010). Major lode Au and lode Sb producer; produced more than 5,264,086 oz Au and over 2,000 tons Sb from veins and shear zones through 2010. Production of W exceeded 4,000 short ton units since 1915, all derived from skarn near Cretaceous quartz monzonite (fig. C-3).

49a **Fort Knox**—Disseminated Au deposit within granodiorite/quartz monzonite pluton near Fairbanks. Proven and probable reserves as of December 31, 2010, open at depth, are 5,793,000 oz of Au in 456.2 million tons of rock at an average Au grade of 0.013 oz/ton. Fairbanks Gold Mining Inc. at Fort Knox and True North mines produced 4,956,837 oz of Au from 1996 to 2010 (fig. C-3).

49b **Ryan Lode**—Based on a 0.015 oz/ton cutoff, total reserves in the metasediment-hosted Ryan Lode and subparallel igneous-hosted Curlew Shear are 822,200 oz of Au in 14.6 million tons of rock. A geologic resource of about 2.4 million oz occurs within the total shear zone system (fig. C-3).

49c **Grant Mine**—Series of subparallel Au-bearing quartz veins in schist and quartzite of Ester Dome based on exploration in 1990. Indicated reserves of the O'Dea vein system are 212,000 tons of 0.36 oz/ton Au. Other similar vein systems are found nearby (fig. C-3).

49d **True North**—Au occurs in siderite–quartz veins in carbonaceous quartzite and schist in a terrane containing eclogitic rocks. An indicated resource of 188,000 oz Au at grade of 0.040 oz/ton Au in 4,665,000 tons of rock as of December 31, 2006. 11.04 million tons of 0.04 oz/ton ore were processed at Fort Knox mill from 2001 through 2004. True North was reclaimed in 2010 (fig. C-3).

49e **Dolphin**—Mineralized intermediate intrusion contains anomalous Au, As, Bi, and Sb. Discovery hole in 1995 intercepted 330 ft of 0.049 oz/ton Au (fig. C-3).

49f **Gil**—Gold occurs in two calc-silicate zones within Paleozoic schist units. Gold enrichment occurs along iron-stained shears and within quartz–calcite veinlets. Drilling identified an in-place Au resource of 192,700 oz in 5.12 million tons of ore at an average grade of 0.038 oz/ton Au (fig. C-3).

50 **Mt. Prindle**—Significant U-rare-earth-element mineralization in Mesozoic alkaline igneous rocks. Rock geochemical values of up to 0.7% U; up to 15% rare-earth elements reported (fig. C-3).

51 **Twin Mountain**—Significant W mineralization associated with skarn development along contact zone of quartz monzonite stock of Cretaceous age (fig. C-2).

52 **Circle mining district**—Currently one of Alaska's largest producing placer Au districts; produced more than 1,103,403 oz Au since discovery in 1893 to 2010. Has significant potential for Sn, W, and Au mineralization from variety of lode sources (fig. C-3).

53 **Three Castle Mountain, Pleasant Creek, Casca VABM**—Stratabound Pb–Zn massive sulfide mineralization. Reported grades of up to 17% Zn and 2% Pb (fig. C-1).

54 **Bonnifield district massive sulfide deposits (Anderson Mountain, Dry Creek, Sheep Creek, Virginia Creek, BT, Liberty Bell)**—Significant volcanogenic Cu–Pb–Zn–Ag massive sulfide deposits of Devonian to Mississippian age. Potential for high-grade deposits reported. Includes Liberty Bell stratabound Au–B deposit and mineralization in Sheep Creek; latter contains Sn as well as base metals (fig. C-1).

55 **Delta massive sulfide belt**—Contains at least 30 known volcanogenic massive sulfide deposits and

occurrences. Grades from 0.3–1.1% Cu, 1.7–5.7% Zn, 0.5–2.3% Pb, 0.7–2.0 oz/ton Ag, and 0.018–0.061 oz/ton Au; estimated potential reserve of 40 million tons for all deposits. Recent exploration has identified several gold prospects associated with silicified structures in the White Gold trend (fig. C-1).

56 **Mosquito, Peternie**—Porphyry Mo prospects of early Tertiary age; reported grades of up to 0.17% Mo (fig. C-2).

57 **Taurus**—Significant major porphyry Cu–Au prospect of Paleocene age. East Taurus zone contains inferred reserves of 140 million tons grading about 0.30% Cu and 0.01 oz/ton Au, and 0.03% Mo (fig. C-2).

58 **Big Creek/Ladue**—Stratabound Pb–Zn–Ag massive sulfide prospects in metavolcanic rocks (fig. C-1).

59 **Slate Creek**—At least 55 million tons of 6.3%, high-quality chrysotile asbestos in serpentinized ultramafic rocks of Permian(?) age (fig. C-3).

60 **Fortymile mining district**—Major placer Au district. Produced more than 577,017 oz placer and very minor lode Au since discovery in 1883 to 2010, the longest continuous production of Au (120 years) of any Alaskan mining district (fig. C-3).

61 **Kantishna mining district**—Major placer Au and lode Ag–Au–Pb–Zn–Sb–W district. Produced 99,307 oz placer and lode Au, about 307,000 oz lode Ag, and 2,500 tons Sb from shear zones and vein deposits hosted in metamorphic units of Yukon–Tanana terrane. Nearly 90 lode deposits have been identified; potential exists for significant Ag–Au–Pb–Zn resources. Metalliferous stratabound base metal deposits occur in schist and quartzite (fig. C-3).

62 **Stampede mine**—Major Sb deposit; produced more than 1,750 tons Sb from large shear zone in polymetamorphic rocks of Yukon–Tanana terrane (fig. C-3).

63 Coal Creek—Greisen-hosted Sn–Cu–W deposit in "McKinley" age pluton (55 million years old). Reported reserves of 5 million tons of ore that grade 0.28% Sn and 0.3% Cu with credits of W, Ag, and Zn (fig. C-2).

64 **Golden Zone mine**—Major Au–Cu–Ag deposits in Late Cretaceous breccia pipe and skarn deposits. Produced more than 1,581 oz Au, 8,617 oz Ag, and 21 tons Cu. The Golden Zone deposit contains measured and indicated resources of approximately 2 million tons, grading 0.106 oz/ton Au, 0.47 oz/ton Ag and 0.12% Cu (utilizing a 0.05 oz/ton Au cut-off grade), and contains approximately 214,800 ounces of gold, 948,000 ounces of silver and 24,000 pounds of copper. (figs. C-1, C-3).

65 **Nim Prospect**—Porphyry Cu–Ag–Au deposit of Late Cretaceous age. Reported grades of up to 5.0% Cu and 9 oz/ton Ag (fig. C-1).

66 **Valdez Creek mining district**—About 520,425 oz Au production through 2010. Cambior Alaska Inc., the largest placer mine in Alaska, operated in this district until September 1995 (fig. C-3).

67 **Caribou Dome (Denali)**—Ten identified stratabound Cu deposits in volcanic sedimentary rocks of Triassic age. Proven and probable ore is 700,000 tons grading 6% Cu with Ag credits, with indicated resources that may contain 2 million tons ore over strike length of 4,000 ft (fig. C-1).

67a **Zackly**—Disseminated Cu and Au in garnet–pyroxene skarn and marble. Reserves are estimated at 1.4 million tons grading 2.6 percent Cu and 0.175 oz/ton Au (fig. C-1).

68 **Chistochina mining district**—Porphyry Cu prospects of Tertiary age and placer Au district; produced more than 182,719 oz Au and small amount Pt from placer deposits through 2006 (figs. C-2, C-3).

69 **Nabesna mine**—Classic high-grade Au skarn that envelopes quartz diorite of Jurassic(?) age; produced more than 66,500 oz Au from about 88,000 tons of ore from 1930 to 1941 (fig. C-3).

70 **Spirit Mountain**—Massive and disseminated Cu–Ni mineralization in mafic–ultramafic complex (fig. C-3).

71 **Kennecott deposits**—Major stratiform Cu–Ag massive sulfide deposits localized near contact between Chitistone Limestone and Nikolai Greenstone of Triassic age; contained some of highest grade Cu lodes mined in North America. From 1911 to 1938, produced more than 600,000 tons Cu and 10 million oz Ag from 4.8 million tons ore. Some reserves remain (fig. C-1).

72 **Binocular and other prospects**—Kennecott-type Cu–Ag massive sulfide deposits (fig. C-1).

73 **Bond Creek–Orange Hill**—Two major porphyry Cu–Mo deposits of Late Cretaceous age; reported inferred reserves of 850 million tons ore that grade 0.3 to 0.5% Cu and 0.03% Mo (fig. C-2).

74 **Carl Creek**—Porphyry Cu prospect in altered intrusive complex; similar to locality 73 (fig. C-2).

75 **Baultoff**—Porphyry Cu prospect in altered intrusive rocks; inferred reserves of 145 million tons of 0.20% Cu; similar to locality 73 (fig. C-2).

76 **Horsfeld**—Porphyry Cu prospect of Late Cretaceous age (fig. C-2).

77 **Midas mine**—Significant stratabound Cu (Ag–Au–Pb–Zn) massive sulfide deposit in volcanic sedimentary rocks of Tertiary Orca Group. Produced more than 1,650 tons Cu from 49,350 tons ore (fig. C-1).

78 **Ellamar**—Stratabound Cu–Zn–Au massive sulfide deposit in sediment of Eocene(?) Orca Group. Produced more than 8,000 tons Cu, 51,307 oz Au, and 191,615 oz Ag from about 301,835 tons ore (fig. C-1).

79 **Willow Creek, Independence, Lucky Shot, War Baby**—Major lode Au deposits (Ag–Cu–Pb–Zn–Mo) in veins cutting Mesozoic quartz diorite. Produced more than 606,400 oz Au from lode sources and about 55,600 oz Au from associated placer deposits (fig. C-3).

80 **Latouche, Beatson**—Major stratabound Cu–Zn–Ag massive sulfide deposits in Orca Group sedimentary rocks and mafic volcanic rocks. Produced more than 10,250 tons Cu from 6 million tons ore. Inferred reserves of 5 million tons ore that grade 1% Cu, 1.5% Pb+Zn (fig. C-1).

81 **Rua Cove**—Major stratabound Cu–Zn massive sulfide deposit in complex ore shoots enclosed in mafic volcanic rocks of Orca Group. Reported reserves of more than 1.1 million tons ore that grade 1.25% Cu (fig. C-1).

82 **Red Mountain and Claim Point**—Significant Cr occurrences associated with Jurassic layered ultramafic complexes at Red Mountain near Seldovia. More than 39,951 tons of metallurgical-grade ore shipped through 1976; huge low-grade Cr resource may remain, of which 30 million tons grade 5.1% Cr2O3 (fig. C-3).

83 **Red Devil**—Major Hg–Sb deposit; high-grade epithermal Hg–Sb deposit hosted in shear zones in Kuskokwim Group sedimentary rocks. More than 35,000 flasks Hg produced from 75,000 tons ore (fig. C-3).

84 **Aniak district**—Significant placer Au district with 607,248 oz Au produced through 2010, mainly from the Nyac and Donlin Creek areas (fig. C-3).

85 **Goodnews Bay**—Major placer Pt district; estimated to have produced in excess of 555,000 oz refined PGE metals from 1934 to 1976; one of the largest known PGE metal resources in United States. Possible resources of 60 million yd3 of deep, PGE-bearing gravels remain. Lode source believed to be Alaska-type zoned ultramafic complex of Jurassic or Cretaceous age. Possible significant offshore placer potential (fig. C-3).

86 **Apollo–Sitka mines**—Major lode Au deposits; produced more than 107,600 oz Au from ore that averaged about 0.22 oz/ton Au. Inferred reserves are 748,000 tons grading 0.76 oz/ton Au, 2.16 oz/ton Ag, with base metal credits (fig. C-3).

87 **Pyramid**—Late Tertiary porphyry Cu–Mo deposit; inferred reserves of 125 million tons ore that grade 0.4% Cu and 0.03% Mo reported (fig. C-2).

88 **Ivanof**—Late Tertiary porphyry Cu prospect; grades of up to 0.72% Cu reported. Potential for large tonnages (fig. C-2).

89 **Weasel Mountain, Bee Creek**—Porphyry Cu–Mo prospect of late Tertiary to Quaternary age; grades of up to 0.48% Cu and 0.035% Mo reported. Potential for moderate tonnages of low-grade mineralization (fig. C-2).

90 **Mike deposit**—Porphyry Mo prospect of late Tertiary age; grades up to 0.21% Mo. Potential for large tonnages of low-grade Mo mineralization (fig. C-2).

91 **Rex deposit**—Porphyry Cu prospect similar to locality 90; grades up to 0.3% Cu. Potential for moderate reserves of low-grade mineralization (fig. C-2).

92 **Kasna Creek**—Major stratiform Cu–Pb–Zn and skarn-sulfide deposits of Mesozoic age in mafic, volcanic, and sedimentary rocks; reported reserves exceeding 10 million tons ore that grade more than 1% Cu (fig. C-1).

93 **Sleitat Mountain**—High-grade east–west-trending, Sn–W–Ag topaz–quartz greisen system hosted in 59-million-year-old granite and in hornfels. Zone up to 3,000 ft long and 500 ft wide. One drill-hole with 85 ft of 1.8% Sn, and 0.4% W. Inferred resources up to 106,000 tons Sn in 29 million tons ore (fig. C-2).

94 **Jimmy Lake**—Complex Cu–Ag–Sn mineralization of late Tertiary(?) age; reported grades of up to 105 oz/ton Ag and 3% Cu (fig. C-1).

95 **Haines Barite/Palmer**—Major stratiform Ba–Pb–Zn–Cu–Ag deposit in pillow-basalt-dominated section of Paleozoic or Triassic age; consists of 48- to 60-ft-thick zone of 60% barite with upper zone (2 to 8 ft thick) of massive sulfides that contain 2% Pb, 3% Zn, 1% Cu, up to 4 oz/ton Ag, and 0.12 oz/ton Au. Inferred resource of 5.24 million tons grading 1.84% Cu, 4.57% Zn, 0.849 oz/ton Ag and 0.008 oz/ton Au (fig. C-1).

96 **Klukwan**—Major Fe–Ti deposits in zoned ultramafic complex of Mesozoic age; reported to contain 3 billion tons of material grading 16.8% Fe and 1.6 to 3.0% Ti (fig. C-3).

97 **Nunatak**—Porphyry Mo deposit; reported reserves of 2.24 million tons ore grading 0.067% Mo, 0.16% Cu, and 129.5 million tons of 0.026% Mo, 0.18% Cu (fig. C-2).

98 **Brady Glacier**—Major Ni–Cu deposit in layered gabbro–pyroxenite complex of Tertiary age. Proven reserves of 100 million tons ore that grade 0.5% Ni, 0.3% Cu reported and about 0.03% Co; also contains PGE concentrations (fig. C-3).

99 **Mertie Lode and Funter Bay**—Contains substantial reserves of lode Au mineralization. Past production totaled about 15,000 oz Au. Deposits also contain significant Ni–Cu and Pb–Zn–Ag mineralization. Funter Bay deposit contains reported reserves of 560,000 tons that grade 0.34% Ni, 0.35% Cu, and 0.15% Co in gabbro-pipe system (fig. C-3).

100 **Alaska–Juneau**—Major lode Au deposit that consists of 100- to 300-ft-wide zone that contains en echelon, Au–bearing quartz veins in metamorphic rocks; produced more than 3.52 million oz Au from 88.5 million tons ore from 1893 to 1944. Reserves (all categories) of 105.7 million tons of 0.05 oz/ton Au (fig. C-3).

101 **Chichagof and Hirst Chichagof**—Major lode Au deposits in quartz veins that cut Mesozoic graywacke; produced more than 770,000 oz Au, most of which was produced at Chichagof Mine. Inferred leased reserves estimated to be 100,000 oz Au (fig. C-3).

102 **Mirror Harbor**—Ni–Cu mineralization in layered gabbro complex of Mesozoic age; reported proven reserves of 8,000 tons of 1.57% Ni and 0.88% Cu and reported inferred reserves of several million tons ore that grade 0.2% Ni and 0.1% Cu (fig. C-3).

103 **Bohemia Basin**—Major Ni–Cu–Co mineralization in layered mafic complex similar to locality 102; reported reserves of 22 million tons ore that grade 0.33 to 0.51% Ni, 0.21 to 0.27% Cu, and 0.02% Co, all of which are recoverable with standard flotation technology (fig. C-3).

104 **Apex–El Nido**—Significant lode Au–W deposits occurring as cross-cutting veins in graywacke;

produced more than 50,000 oz Au (fig. C-3).

105 **Greens Creek**—Major sediment-hosted Pb–Zn–Cu–Ag–Au volcanogenic massive sulfide deposit of Devonian or Triassic age. Production from 1989–1993 and 1996–2010 is 1,255,471 tons of Zn, 389,673 tons of Pb, more than 8,600 tons of Cu, 165.84 million oz of Ag, and 1.25 million oz of Au. 2010 probable reserve estimate is 8.23 million tons grading 9.3% Zn, 3.5% Pb, 12.1 oz/ton Ag, and 0.092 oz/ton Au. Inferred resources are 4.34 million tons grading 5.6% Zn, 2.2% Pb, 0.089 oz/ton Au, and 11.8 oz/ton Ag. (fig. C-1).

106 **Sumdum**—Volcanogenic Cu–Pb–Zn massive sulfide deposit in Mesozoic metamorphic complex with potential strike length of more than 10,000 ft. Inferred reserves of 26.7 million tons ore that grade 0.57% Cu, 0.37% Zn, and 0.3 oz/ton Ag reported (fig. C-1).

107 **Snettisham**—Fe–Ti deposit in mafic zoned intrusive complex; reported grades of about 18.9% Fe and 2.6% Ti (fig. C-3).

108 **Tracy Arm**—Stratabound Cu–Zn–Pb massive sulfide prospect in Mesozoic schist; more than 1,100 ft long and up to 12 ft thick. Reported grades of 1.5% Cu, 3.9% Zn, 0.76 oz/ton Ag, and 0.013 oz/ton Au (fig. C-1).

109 **Red Bluff Bay**—Significant chrome mineralization in Mesozoic ultramafic complex (probably ophiolite); reported reserves of 570 tons of material that grade 40% Cr and 29,000 tons that grade 18–35% Cr (fig. C-3).

110 **Cornwallis Peninsula**—Volcanogenic Cu–Pb–Zn–Ag–Ba massive sulfide deposit of Triassic(?) age; reported grades of up to 20% Pb–Zn and 23 oz/ton Ag (fig. C-1).

111 **Castle Island**—Stratiform barite deposit of Triassic age hosted in carbonate and pillow basalt; about 856,000 tons of raw and refined barite produced from 1963 to 1980; also contains Zn, Pb, and Cu sulfides. Reported to be mined out (fig. C-1).

112 **Groundhog Basin**—Area with several massive sulfide prospects in Mesozoic schist and gneiss whose origins are possibly plutonic associated. Reported grades of up to 8% Pb, 29 oz/ton Ag, and 0.5 oz/ton Au. Sn has also been recently identified. Area also contains potential for porphyry Mo deposits (fig. C-1).

113 **Snipe Bay**—Ni–Cu deposit in zoned mafic–ultramafic complex; inferred reserves of 430,000 tons of 0.3% Ni, 0.3% Cu, and 0.13 oz/ton Ag reported (fig. C-3).

114 **Kasaan Peninsula**—Major skarn-type Cu–Fe–Au massive sulfide deposit of Jurassic age; area has produced more than 14,000 tons Cu, and 55,000 oz Ag. Reported reserves of 4 million tons ore grading 50% Fe and less than 2% Cu (fig. C-1).

115 **Salt Chuck**—Cu–PGM–Ag–Au deposit in contact zone between pyroxenite and gabbro within Alaska-type zoned mafic–ultramafic pluton. From 1900 to 1941, 2,500 tons Cu, more than 20,000 oz PGM, and Au and Ag credits were produced from 325,000 tons ore (fig. C-3).

116 **Union Bay**—Significant Fe–Ti– (V) mineralization in zoned, Ural–Alaska-type ultramafic complex At least seven zones of PGE–magnetite hydrothermal mineralization associated with pyroxene veins that crosscut magmatic layering (fig. C-3).

117 **Hyder mining district**—Area produced more than 25,000 tons high-grade W–Cu–Pb–Zn–Ag ore from 1925 to 1951 from crosscutting ore shoots in Texas Creek granodiorite of Tertiary age. Area contains potential for porphyry Mo–W mineralization and massive sulfide–skarn Pb–Ag–Au–W deposits (figs. C-1, C-2).

118 **Jumbo**—Cu–Fe–Mo–Ag skarn deposit; produced more than 5,000 tons Cu, 280,000 oz Ag, and 7,000 oz Au from 125,000 tons ore. Zoned magnetite–Cu skarns are associated with epizonal granodiorite pluton of Cretaceous age. Reported reserves of 650,000 tons ore that grade 45.2% Fe, 0.75% Cu, 0.01 oz/ton Au, and 0.08 oz/ton Ag (fig. C-1).

119 **Copper City**—Stratiform Cu–Zn–Ag–Au massive sulfide deposit in late Precambrian or earliest Paleozoic Wales Group. Reported grades of up to 12.7% Cu, 2.7% Zn, 2.5 oz/ton Ag, and 0.2 oz/ton Au (fig. C-1).

120 **Quartz Hill**—A porphyry Mo deposit hosted in a 25-million-year-old composite felsic pluton. Probable reserves are 232 million tons with a grade of 0.22% MoS2, and possible reserves are 1.2 billion tons with 0.12% MoS2 (fig. C-2).

121 **Niblack**—Volcanogenic Cu–Pb–Au–Ag massive sulfide deposit hosted in Precambrian(?) Wales Group or Ordovician to Silurian Descon Formation; produced more than 700 tons Cu, 11,000 oz Au, and 15,000 oz Ag. Indicated resource of 2.87 million tons at 2.19% Zn, 1.18% Cu, 0.95 oz/ton Ag and 0.068 oz/ton Au and inferred resource of 1.87 million tons at 3.17% Zn, 1.55% Cu, 0.968 oz/ton Ag and 0.061 oz/ton Au (fig. C-1).

122 **Bokan Mountain**—Numerous rare-earth-element (REE) and U–Th prospects associated with Jurassic peralkaline intrusive complex; from 1955 to 1971, produced more than 120,000 tons ore that graded about 1% U3O8. Contains inferred reserves of about 40 million tons of 0.126% Nb and up to 1% REE metals. Recent work suggests that REE mineralization is unusually enriched in heavy REEs (fig. C-3).

123 Kemuk Mountain—Magmatic Fe–Ti deposit hosted in Cretaceous(?) pyroxenite. Inferred reserves of 2.4 billion tons that average 15–17% Fe, 2–3% TiO2, and 0.16% P2O5 (fig. C-3).

124 **McLeod**—Porphyry Mo deposit that contains quartz–molybdenite fissure veins in quartz–feldspar porphyry. Chip samples contain up to 0.09% Mo (fig. C-2).

125 **Johnson River**—Epigenetic(?) quartz–sulfide stockwork or massive sulfide deposit hosted in volcaniclastic, pyroclastic, and volcanic rocks of Jurassic Talkeetna Formation. Deposit has drilled-out reserves at a $45/ton cutoff with no cut of high Au assays, 1,099,580 tons grading 0.32 oz/ton Au, 0.24 oz/ton Ag, 0.76% Cu, 1.17% Pb, and 8.37% Zn (fig. C-3).

126 Nimiuktuk River—Small hill of massive, high-grade barite estimated to contain at least 1.5 million tons barite. Widespread stream-sediment Ba anomalies in area indicate further barite potential (fig. C-1).

127 **Kensington**—Stockwork quartz veins in sheared and chloritized quartz diorite produced 10,900 tons grading 0.18 oz/ton Au prior to 1930. Began current production in July 2010. Proven and probable reserves of 5.937 million tons grading 0.24 oz/ton Au and containing 1.41 million ounces of Au. Measured and indicated resources of 2.5 million tons grading 0.19 oz/ton Au and containing 478,000 oz Au, with inferred resource of 551,000 tons grading 0.22 oz/ton Au and containing 121,000 oz Au. (fig. C-3).

128 **Jualin**—Five quartz-fissure veins in Cretaceous quartz diorite, more than 15,000 ft of underground workings; produced 48,387 oz Au, mainly prior to 1930. Reserves included in the reserves of the Kensington property (fig. C-3).

129 **Pebble (Copper)**—One of the world's largest Cu–Au porphyry deposits with several known centers, including the Pebble West and Pebble East deposits. At a 0.3% Cu equivalent cut-off grade, the Pebble deposit includes measured resources of 580.9 million tons grading 0.33% Cu, 0.010 oz/ton Au, and 178 ppm molybdenum, indicated resources of 5.97 billion tons grading 0.43% Cu, 0.010 oz/ton Au, and 257 ppm molybdenum, and inferred resources of 5.33 billion tons grading 0.24% Cu, 0.007 oz/ton Au, and 215 ppm molybdenum. Measured and indicated resources total 55.0 billion pounds Cu, 66.9 million oz Au, and 3.28 billion pounds Mo. Inferred resources total 25.6 billion pounds Cu, 40.4 million oz Au, and 2.29 billion pounds Mo. The global resource total is 80.6 billion pounds Cu, 107.3 million oz Au, and 5.75 billion pounds Mo. Mineralized system extends over 35 mi2 area and includes other Cu–Au–Mo porphyry, Cu–Au skarn, and Au vein prospects (fig. C-1).

130 **Pogo**—Au hosted in at least three sub-parallel and tabular, gently dipping, quartz vein zones hosted by Paleozoic gneisses intruded by Cretaceous felsic plutonic rocks. Au in the 3-ft- to 60-ft-thick quartz bodies has a strong correlation with Bi. A mining reserve for the Liese L1 and L2 zones in 2006 was 7.7 million tons at an average grade of 0.47 oz/ton, for a total of 3.63 million oz at a 0.1 oz/ton cut-off grade. Produced 1,493,645 ounces of gold from 2006 to 2010. Other high-grade Au targets have been identified along an 8-mi-long trend southeast of the Liese zones (fig. C-3).

131 **Shotgun**—Quartz stockwork and breccia Au–Cu–As mineralization in a Late Cretaceous rhyolite (granite porphyry) stock. A preliminary, inferred Au resource of 980,000 oz (36.11 million tons at an average grade of 0.027 oz/ton Au) at a 0.016 oz/ton Au cut-off grade, with initial metallurgical tests indicating >90% Au recovery by cyanide leaching (fig. C-3).

132 **Illinois Creek**—Au–Ag–Cu–Pb–Zn–Bi–As-bearing, Fe–Mn oxide (gossan) shear zone crosscutting dolomitic quartzite localized near Cretaceous granitic pluton. Shear zone averaged 148 ft wide, with a drill-defined east–west strike length of 11,600 ft. Produced approximately 143,860 oz Au and 755,600 oz Ag from 1997 to 2004. Past ore grade of 0.076 oz/ton Au and 1.6 oz/ton Ag (figs. C-1, C-3).

133 **Calder Mine**—Seven recrystallized carbonate units exposed at the apex of a large regional antiform. Drilling has identified 13 million tons of chemically homogenous, high-brightness, high-whiteness marble with a purity of 98 to 99% calcium carbonate. Potential resource of 80 million tons of high-value calcium carbonate (fig. C-2).

134 **Vinasale Mountain**—Intrusion-hosted Au deposit. Au occurs as disseminated and veinlet mineralization, with arsenopyrite and pyrite in quartz–dolomite hydrothermal breccias, magmatic breccias, and zones of phyllic and silicic alteration hosted within a 69 Ma quartz monzonite stock. Inferred resource of 14.35 million tons grading 0.067 oz/ton Au, with an 0.03 oz/ton cut-off grade was for the Central zone (fig. C-3).

135 **Nixon Fork**—Au–Cu skarn deposits; historic Nixon Fork mine produced 59,500 oz Au from Late Cretaceous skarns associated with quartz-monzonite–Devonian-limestone contact zones. Underground mining resumed in October 1995, with 137,748 oz of Au, 1,050 tons of Cu, and significant Ag produced through mine closure in 1999. Produced 6,775 oz Au, 87,627 pounds Cu, and 3,739 oz Ag in 2007 before shutting down. 2010 indicated resources are 134,140 tons grading 0.78 oz/ton Au in the mine, 101,410 tons grading 0.23 oz/ton Au in the tailings, and a total of 128,500 ounces of contained gold. Inferred resources are 78,000 tons grading 0.81 oz/ton Au in the mine, 52,900 tons grading 0.21 oz/ton Au in the tailings, and a total of 74,600 ounces of contained gold (fig. C-3).

136 **Von Frank Mountain**—Au and very weak Cu mineralization are associated with chalcopyrite, pyrite, and rare molybdenite within a zone of quartz stockwork veining hosted in a 69 Ma quartz–diorite stock. The stock is a cupola of the larger Von Frank Pluton. Drill intercepts include up to 429 ft wide with an average grade of 0.013 oz/ton Au. Higher-grade intercepts include 0.035 oz/ton Au up to 135 ft (fig. C-3).

137 **Donlin Creek**—Au mineralization associated with disseminated pyrite and arsenopyrite, sulfide veinlets, and quartz–carbonate–sulfide veinlets in sericite-altered Late Cretaceous to early Tertiary rhyodacitic porphyry dikes and sills. Au mineralization is structurally controlled, refractory, and occurs along a 4-mile-long, 1-mile-wide zone. 2010 proven reserves are 7.7 million tons grading 0.072 oz/ton Au with 0.55 million ounces of contained gold. Probable reserves are 507.7 million tons grading 0.065 oz/ton Au with 33.04 million ounces of contained gold. Measured resources are 0.2 million tons grading 0.193 oz/ton Au with 0.04 million ounces of contained gold. Indicated resources are 43.6 million tons grading 0.097 oz/ton Au with 4.25 million ounces of contained gold. Inferred resources are 64.4 million tons grading 0.069

oz/ton Au with 4.41 million ounces of contained gold. Total gold reserves are 33.59 million ounces, while total reserves and resources are 42.29 million ounces of gold. Considered the 25th largest gold resource in the world (fig. C-3).

138 **Kaiyah**—Au–Ag epithermal prospect in silicified Koyukuk sedimentary rocks adjacent to Poison Creek caldera. Polymetallic sulfides in quartz veins, with some veins more than 100 ft thick, and silicification are associated with pervasive advanced argillic and sericite alteration (fig. C-3).

139 **Shulin Lake**—Micro- and macro-diamonds occur in interbedded volcaniclastic and tuffaceous rocks containing olivine and pyroxene. Discovered by tracing diamond indicator minerals in placer gravels. Possibly lamproitic intrusions with up to 1-mi-diameter circular aeromagnetic anomalies (fig. C-3).

140 **Canwell and Nikolai Complex**—Ni–Cu–PGE semi-massive to massive sulfide prospects hosted in mafic and ultramafic rocks of the Nikolai intrusive/extrusive complex. Five mafic–ultramafic intrusions in the central Alaska Range are co-magmatic with the Nikolai flood basalts (fig. C-3).

141 **Duke Island**—Cu–Ni–PGE disseminated, semi-massive, and massive sulfides associated with two zoned, Ural–Alaska type ultramafic bodies (fig. C-3).

APPENDIX E

Primary metals production in Alaska, 1880-2010 [a,b]

Year	Gold [c]		Silver		Mercury		Antimony		Tin		Lead		Zinc		Platinum [e]		Copper		Chromium	
	(oz)	(m$)	(oz)	(t$)	(flask [d])	(t$)	(lb)	(t$)	(lb)	(t$)	(tons)	(t$)	(tons)	(t$)	(oz)	(t$)	(lb)	(m$)	(tons)	(t$)
1880–1899	1,153,889	$ 23.85	496,101	$ 329.0	--	--	--	--	--	--	250	$ 17.0	--	--	--	--	--	--	--	--
1900–1909	6,673,173	137.94	1,324,580	779.5	--	--	--	--	304,000	$ 112.2	369	32.8	--	--	--	--	29,549,486	$ 4.81	--	--
1910–1919	7,209,094	149.01	7,058,235	5,107.5	--	--	2,760,000	W	1,640,000	805.9	3,565	470.2	--	--	914	$ 116.5	515,253,817	109.90	2,200	W
1920–1929	3,373,336	69.77	6,407,375	5,160.8	117	$ 7.6	W	W	317,800	163.9	7,961	1,084.1	--	--	5,750	484.9	643,576,929	93.33	--	--
1930–1939	5,345,205	150.84	3,250,173	1,889.8	31	2.3	1,616,000	$ 228.3	1,024,400	502.1	10,791	914.3	--	--	102,615	5,427.1	184,522,000	19.48	--	--
1940–1949	3,137,447	109.79	794,842	577.0	3,094	724.3	2,062,080	311.1	319,200	230.3	3,096	405.2	678	$ 0.5	225,285	12,623.3	433,700	0.24	7,409	$ 250.9
1950–1959	2,297,827	80.63	321,669	292.9	18,185	4,370.0	2,663,520	3,697.6	1,144,000	1,310.5	177	38.6	--	--	107,927	9,403.9	106,000	0.14	21,442	1,975.8
1960–1969	751,870	26.56	59,300	70.7	13,996	3,098.0	228,800	267.8	--	--	40	9.9	--	--	111,556	13,618.5	352,000	0.14	--	--
1970–1979	324,906	55.77	54,700	250.5	4,040	1,694.0	1,473,000	1,714.0	166,000	949.0	20	8.0	--	--	41,604	6,826.0	--	--	8,000	1,200.0
1980	75,000	32.00	7,500	111.0	--	--	--	--	120,000	984.0	31	29.0	--	--	--	--	--	--	--	--
1981	134,200	55.20	13,420	111.3	W	W	--	--	106,000	700.0	--	--	--	--	900	200.0	--	--	--	--
1982	175,000	69.90	22,000	198.0	--	--	--	--	198,000	1,365.0	--	--	--	--	W	W	--	--	--	--
1983	169,000	67.60	33,200	332.0	--	--	22,400	45.0	215,000	1,100.0	--	--	--	--	W	W	--	--	--	--
1984	175,000	62.13	20,000	159.0	5	1.5	135,000	225.8	225,000	400.0	--	--	--	--	W	W	--	--	--	--
1985	190,000	61.18	28,500	171.0	27	10.0	65,000	98.0	300,000	650.0	--	--	--	--	--	--	--	--	--	--
1986	160,000	60.80	24,000	134.4	12	2.8	45,000	67.5	340,000	890.0	--	--	--	--	W	W	--	--	--	--
1987	229,707	104.51	54,300	391.0	--	--	--	--	288,000	460.0	--	--	--	--	W	W	--	--	--	--
1988	265,500	112.84	47,790	282.0	W	W	--	--	300,000	950.0	--	--	--	--	25	13.8	--	--	--	--
1989	284,617	108.70	5,211,591	27,300.0	--	--	--	--	194,000	672.0	9,585	7,700.0	19,843	29,400.0	--	--	--	--	--	--
1990	231,700	89.20	10,135,000	50,675.0	--	--	--	--	57,000	200.0	44,220	30,954.0	181,200	253,680.0	--	--	--	--	--	--
1991	243,900	88.29	9,076,854	39,110.0					6,800	22.1	69,591	33,403.7	278,221	278,221.0	15	5.3	--	--	--	--
1992	262,530	88.46	9,115,755	34,913.0	--	--	--	--	1,500	5.9	68,664	31,585.0	274,507	301,957.7	--	--	--	--	--	--
1993	191,265	68.64	5,658,958	24,333.0	--	--	--	--	21,000	50.6	38,221	13,759.6	268,769	236,516.7	3	1.2	--	--	--	--
1994	182,100	70.29	1,968,000	10,391.0	--	--	--	--	--	--	36,447	25,512.9	329,003	296,102.7	5	2.1	--	--	--	--
1995	141,882	56.04	1,225,730	6,655.0	--	--	--	--	--	--	58,098	34,428.6	359,950	345,552.0	1	0.4	--	--	--	--
1996	161,565	62.62	3,676,000	19,078.0	--	--	--	--	--	--	70,086	52,284.0	366,780	361,646.0	2	0.8	780,000	0.80	--	--
1997	590,516	207.29	14,401,165	70,710.0	--	--	--	--	--	--	88,560	49,593.0	419,097	494,888.0	--	--	3,440,000	3.54	--	--
1998	594,191	174.62	14,856,000	82,154.0	--	--	--	--	--	--	102,887	49,386.0	549,348	505,400.0	--	--	3,800,000	2.85	--	--
1999	517,890	144.26	16,467,000	85,628.0	--	--	--	--	--	--	125,208	57,596.0	643,642	630,769.0	--	--	4,200,000	2.98	--	--
2000	551,982	154.06	18,226,615	90,404.0	--	--	--	--	--	--	123,224	51,754.0	669,112	682,494.0	--	--	2,800,000	2.30	--	--
2001	550,644	149.25	16,798,000	73,408.0	--	--	--	--	--	--	127,385	56,049.0	634,883	507,907.0	--	--	2,800,000	1.99	--	--
2002	562,094	174.28	17,858,183	82,326.0	--	--	--	--	--	--	146,462	61,514.0	718,103	502,674.0	--	--	3,200,000	2.27	--	--
2003	528,191	191.93	18,589,100	95,300.0	--	--	--	--	--	--	162,479	64,279.0	714,769	536,348.0	--	--	--	--	--	--
2004	456,508	192.34	16,947,270	113,056.9	--	--	--	--	--	--	150,796	120,636.8	680,015	651,432.2	--	--	--	--	--	--
2005	427,031	189.92	11,670,000	85,382.0	--	--	--	--	--	--	131,366	115,230.0	684,462	862,108.0	--	--	--	--	--	--
2006	570,129	344.05	16,489,394	190,415.9	--	--	--	--	--	--	157,128	183,629.3	673,967	2,002,971.4	--	--	--	--	--	--
2007	726,933	511.09	20,203,985	270,402.1	--	--	--	--	--	--	167,181	389,532.2	696,115	2,048,451.6	--	--	87,627	0.28	--	--
2008	800,752	698.22	14,643,735	219,496.4	--	--	--	--	--	--	153,705	287,428.4	626,135	1,055,220.1	--	--	--	--	--	--
2009	780,657	759.07	15,617,436	229,159.3	--	--	--	--	--	--	167,204	260,838.2	712,496	1,068,744.0	--	--	--	--	--	--
2010	914,462	1,119.79	139,991,297	282,523.5	--	--	--	--	--	--	146,480	284,171.2	667,539	1,212,390.3	--	--	--	--	--	--
Other [f]	--	--	--	--	1,438	--	--	--	--	--	--	--	--	--	71,946	17,091.9	--	--	--	--
TOTAL	**40,416,575**	**$ 5,193.87**	**263,236,020**	**$ 1,687,485.7**	**40,945**	**$ 9,910.5**	**11,070,800**	**$ 6,655.1**	**7,287,700**	**$ 12,523.5**	**2,057,593**	**$ 1,719,264.6**	**9,788,599**	**$ 12,583,739.9**	**668,548**	**$ 48,723.8**	**1,394,901,559**	**$ 245.05**	**39,051**	**$ 3,426.7**

[a] From published and unpublished state and federal documents. Where state and federal figures differ significantly, state figures are used.

[b] Please refer to previous editions of this appendix for year-to-year production information for years 1900 to 1979.

[c] Gold production adjusted to be consistent with mining district production totals.

[d] 76-lb flask.

[e] Crude platinum; total production of refined metal is about 575,000 oz.

[f] Not traceable by year.

W = withheld

-- = Not reported

t$ = Thousand dollars

m$ = Million dollars

APPENDIX F

Production of industrial minerals, coal, and other commodities in Alaska, 1880-2010 [a,b]

Year	Coal		Sand and gravel		Rock[c] Barite				Other[d]
	short tons	m$	short tons	m$	short tons	m$	short tons	t$	$
1880–1899	19,429	0.14	--	--	7,510	0.04	--	--	--
1900–1909	33,214	0.20	--	--	15,318	0.18	--	--	246,403
1910–1919	210,806	1.16	--	--	50,014	0.29	--	--	2,014,788
1920–1929	937,860	5.20	--	--	494,417	2.73	--	--	2,523,754
1930–1939	1,222,797	5.49	42,332	0.02	689,676	2.75	--	--	899,767
1940–1949	3,189,026	20.22	1,758,504	0.69	286,341	1.33	--	--	27,124,158
1950–1959	6,632,641	59.70	65,804,686	55.14	1,843,560	5.17	--	--	25,443,427
1960–1969	7,849,000	58.84	163,315,000	176.72	2,034,000	4.20	225,000	1,200.0	34,143,000
1970–1979	7,405,000	88.97	489,522,000	1,004.88	47,930,000	137.35	502,000	8,217.0	77,501,000
1980	800,000	16.00	40,000,000	86.00	3,700,000	15.40	50,000	2,000.0	97,500
1981	800,000	17.60	46,000,000	88.20	4,200,000	19.30	--	--	256,000
1982	830,000	18.00	45,000,000	91.00	3,400,000	15.60	--	--	150,000
1983	830,000	18.00	50,000,000	105.00	5,270,000	25.00	--	--	242,000
1984	849,161	23.75	27,000,000	95.00	2,700,000	16.00	--	--	875,875
1985	1,370,000	39.73	28,184,080	112.06	2,500,000	12.00	--	--	559,000
1986	1,492,707	40.10	20,873,110	75.76	4,200,000	20.32	--	--	384,800
1987	1,508,927	42.35	16,696,374	42.66	1,805,000	11.62	--	--	388,400
1988	1,551,162	44.30	17,264,500	48.75	3,600,000	24.65	--	--	389,000
1989	1,452,353	41.46	14,418,000	39.88	2,914,000	20.34	--	--	1,492,000
1990	1,576,000	44.99	15,013,500	40.82	3,200,000	22.10	--	--	400,000
1991	1,540,000	39.00	14,160,011	45.45	3,000,000	22.50	--	--	462,000
1992	1,531,800	38.30	14,599,746	42.20	2,900,000	22.97	--	--	430,000
1993	1,586,545	38.10	13,162,402	40.64	3,561,324	26.21	--	--	465,000
1994	1,490,000	36.75	13,518,321	40.95	3,843,953	27.04	--	--	459,500
1995	1,640,000	41.30	9,847,550	30.89	2,811,152	22.13	--	--	182,500
1996	1,481,000	38.00	9,890,463	32.20	3,000,045	23.56	--	--	200,000
1997	1,446,000	38.05	13,800,000	51.91	3,200,000	20.00	--	--	217,000
1998	1,339,000	35.23	12,363,450	57.28	1,636,200	14.04	--	--	215,000
1999	1,560,000	41.05	10,600,000	52.42	1,640,000	18.01	--	--	190,000
2000	1,473,355	38.77	10,600,000	49.86	5,200,000	36.59	--	--	203,000
2001	1,537,000	48.11	10,360,000	55.22	3,091,000	27.18	--	--	205,000
2002	1,158,000	37.40	22,412,000	120.70	3,152,000	31.44	--	--	200,000
2003	1,088,000	38.08	11,868,001	64.14	861,382	10.41	--	--	175,000
2004	1,450,000	50.75	19,576,092	101.51	7,312,050	106.21	--	--	2,732,554
2005	1,402,174	49.08	16,620,009	76.54	2,803,172	22.55	--	--	809,642
2006	1,397,500	48.91	13,953,465	63.35	2,369,738	23.85	--	--	1,057,500
2007	1,273,004	44.56	14,163,676	76.12	2,211,954	25.51	--	--	1,085,500
2008	1,538,000	53.83	12,461,685	72.44	2,485,820	39.55	--	--	1,159,502
2009	1,861,714	65.16	7,072,037	41.37	1,837,090	27.23	--	--	3,678,930
2010	2,061,000	73.31	6,977,297	47,988,416.00	290,852	4.31			2,303,950
Other	--	--	--	--	2,300,000[e]	W	79,000	W	--
TOTAL	$70,414,175	$1,407	$1,298,898,290	$47,991,594	$148,047,568	$908	$856,000	$11,417	$191,562,450

[a] From published and unpublished state and federal documents. Where state and federal figures differ significantly, state figures are used.

[b] Please refer to previous editions of this appendix for year-to-year production information for years 1900 to 1979.

[c] Building-stone production figures for 1880–1937 are for the southcentral and interior regions of Alaska only.

[d] Includes 2.4 million lb U_3O_8 (1955–1971); 505,000 tons gypsum (1905–1926); 286,000 lb WO_3 (intermittently, 1916–1980); 94,000 lb asbestos (1942–44); 540,000 lb graphite (1917–1918 and 1942–1950); and undistributed amounts of zinc, jade, peat, clay, soapstone, miscellaneous gemstones, and other commodities (1880–1993).

[e] Marble quarried on Prince of Wales Island, southeastern Alaska (1900–1941).

m$ = Million dollars

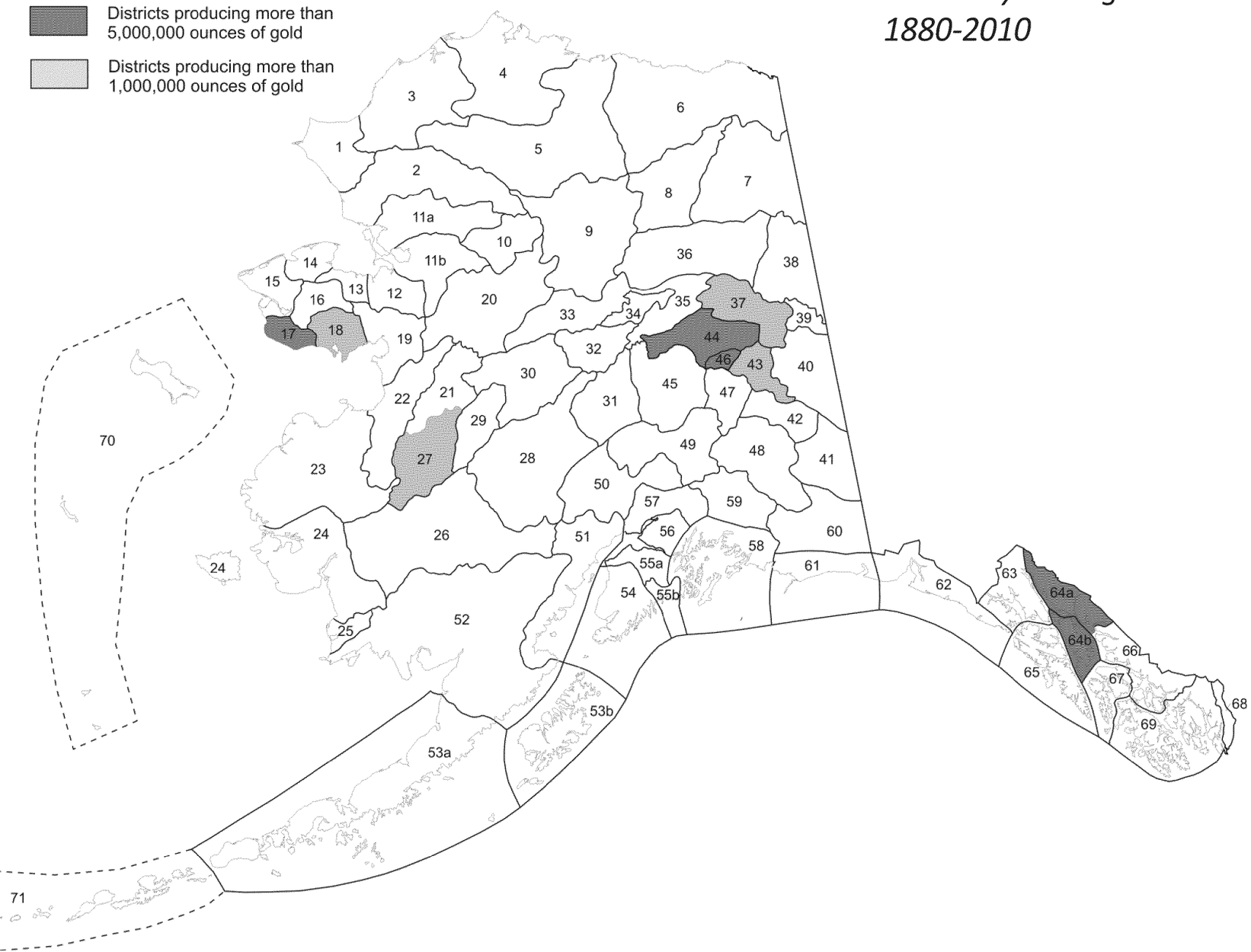
t$ = Thousand dollars

-- = Not reported

W = withheld

Total gold production in Alaska by mining district 1880-2010

	Mining districts[a]	Production (in refined troy ounces) Total production	Placer	Lode
1	Lisburne district	0	0	0
2	Noatak district	7,800	7,800	0
3	Wainwright district	0	0	0
4	Barrow district	0	0	0
5	Colville district	0	0	0
6	Canning district	0	0	0
7	Sheenjek district	0	0	0
8	Chandalar district	68,838	51,438	17,400
9	Koyukuk district	365,594	365,594	0
10	Shungnak district	15,000	15,000	0
11	Kiana & Selawik districts	40,600	40,600	0
12	Fairhaven district (Candle subdistrict)	349,441	349,441	0
13	Fairhaven district (Inmachuk subdistrict)	253,720	253,720	0
14	Serpentine district	4,306	4,306	0
15	Port Clarence district	42,358	42,358	0
16	Kougarok district	188,375	188,375	0
17	Nome (Cape Nome) district	5,014,982	5,014,982	0
18	Council district	1,047,028	1,020,028	27,000
19	Koyuk district	84,376	84,376	0
20	Hughes district	335,266	335,266	0
21	Kaiyuh district	149,703	5,400	144,303
22	Anvik district[b]	7	7	0
23	Marshall district	124,506	124,506	0
24	Bethel district	42,953	42,953	0
25	Goodnews Bay district	31,200	31,200	0
26	Aniak district	607,248	607,248	0
27	Iditarod district	1,564,173	1,561,243	2,930
28	McGrath district	337,006	133,307	203,699
29	Innoko district	749,031	748,875	156
30	Ruby district	477,976	477,976	0
31	Kantishna district	99,307	91,401	7,906
32	Hot Springs district	593,671	593,671	0
33	Melozitna district	13,154	13,154	0
34	Rampart district	202,408	202,408	0
35	Tolovana district	539,533	539,533	0
36	Yukon Flats district	0	0	0
37	Circle district	1,103,403	1,103,403	0
38	Black district	2	2	0
39	Eagle district	52,128	52,128	0
40	Fortymile district	577,017	577,017	0
41	Chisana district	144,515	78,015	66,500
42	Tok district	282	282	0
43	Goodpaster district	1,495,995	2,050	1,493,945
44	Fairbanks district	13,481,137	8,219,351	5,261,786
45	Bonnifield district	94,445	87,745	6,700
46	Richardson subdistrict of Fairbanks district[c]	121,008	118,708	2,300
47	Delta River district	10,520	10,520	0
48	Chistochina district	183,536	183,536	0
49	Valdez Creek district	520,425	518,844	1,581
50	Yentna district	202,091	202,091	0
51	Redoubt district	105	105	0
52	Bristol Bay Region	1,570	1,570	0
53	Kodiak district (53b)–Alaska Peninsula Region (53a)	112,407	4,807	107,600
54	Homer district	16	16	0
55	Hope & Seward districts	135,167	70,167	65,000
56	Anchorage district[d]	242	242	0
57	Willow Creek district	667,827	58,827	609,000
58	Prince William Sound district	137,790	90	137,700
59	Nelchina district	14,757	14,757	0
60	Nizina district	148,500	148,500	0
61	Yakataga district	18,041	18,041	0
62	Yakutat district[e]	13,200	2,200	11,000
63	Juneau district (partial)	82,489	82,489	0
64	Juneau (64a) & Admiralty (64b) districts	9,085,895	81,084	9,004,811
65	Chichagof district	770,000	0	770,000
66	Petersburg district	15,000	15,000	0
67	Kupreanof district	0	0	0
68	Hyder district	219	219	0
69	Ketchikan district	62,002	4,002	58,000
70	Bering Sea Region	0	0	0
71	Aleutian Islands Region	0	0	0
	Unknown (undistributed)[f]	29	29	0
TOTAL		42,601,320 (1,325 tonnes)	24,602,003	17,999,317



[a]Mining district names and boundaries revised slightly from those defined by Ransome and Kerns (1954) and Cobb (1973). Sources of data: U.S. Geological Survey, U.S. Bureau of Mines, and Alaska Territorial Department of Mines records 1880-1930; U.S. Mint records 1930-1969; State of Alaska production records 1970-2006. Entries of "0" generally mean no specific records are available.
[b]Included in Marshall district.
[c]Not included in total for Fairbanks district.
[d]Most placer gold production included in Willow Creek district.
[e]Includes lode production from Glacier Bay area and placer production from Lituya Bay area.
[f]Production that cannot be credited to individual districts due to lack of specific records or for reasons of confidentiality.